

# Ethnic Entrepreneurs in the Most Technologically Sophisticated Sectors of the Economy

A Case Study of the Social Tie-Strategies of Asian Indian Entrepreneurs in Boston's High-Technology Sector



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# Chapter One

## Introduction

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### The Objective of the Thesis

*Mr Shah<sup>1</sup> immigrated to the United States in the 1980s. With a bachelor's degree in engineering from India, an MBA from a local university, and extensive experience in a Boston high-tech firm, he launched his own software firm along Route 128 in 1994....*

This is the story of one of the new Indian entrepreneurs in the Boston high-technology sector. Mr Shah and his fellow Indian entrepreneurs diverge from earlier entrepreneurs of minority background who have concentrated in low-technology industries such as construction, garment manufacturing, food wholesalers, restaurants and gas stations. (Aldrich & Waldinger 1995, Waldinger, 1995, Ward et al 1995, Light 2000). The new Indian entrepreneurs also drastically differ from entrepreneurs in ethnic enclaves (i.e. Chinatown, Little Cuba and Korea town) where minorities traditionally have clustered to organize a variety of enterprises to serve their own ethnic market. The extensive scholarly literature that has documented the presence of minority entrepreneurs in general, and immigrant entrepreneurs in particular, has followed the traditional sectoral concentration of these ethnic groups. In other words, the rich theoretical framework set forth on ethnic entrepreneurship has solely been based on research carried out in spatially clustered arenas and marginalized low-skilled sectors. This theoretical framework has cemented the distinctiveness of ethnic entrepreneurship. Advocates of this framework have pointed out that ethnic minorities express different motives than the mainstream for pursuing entrepreneurship. More importantly, they also highlight the fact that entrepreneurs of minority background adopt distinctive *social tie-strategies* when developing, managing and maintaining a business enterprise. The outsider status of these ethnic groups intensifies close ties of loyalty among group members and helps to foster ethnic solidarity, mutual trust and cooperation. Accordingly, scholars have claimed that ethnic minorities tend to be overreliant on ethnic social ties when mobilizing the resources

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<sup>1</sup> The name of the entrepreneur is fictitious

needed to run a business. Scholars, however, actually know very little about the strategies of minority entrepreneurs like Mr Shah, who have entered the most technologically sophisticated sectors of the economy. The distinctive ethnic tie-strategy that minority entrepreneurs in low-skilled sectors have adopted may not necessarily apply to their counterparts in knowledge intensive sectors. Thus, the assumptions surrounding the tie-strategies of ethnic entrepreneurs must be considered biased and incomplete.

Therefore, the primary objective of this study is to take one step towards making ethnic entrepreneur theory more complete by focusing attention on the social tie-strategies of ethnic entrepreneurs in a *knowledge intensive sector*. A tie-strategy is defined as an actor's pattern of action reflecting how he positions himself to others in order to accomplish his goals (Aldrich & Waldinger 1990). Following from this definition, I intend to pursue the objective of this thesis by *exploring the type and the nature of the social ties* that Asian Indian entrepreneurs have formed, and are making use of, in the daily operations of their firm. Furthermore, I will focus on the individual purposeful action of Indian entrepreneurs embedded in a unique and historically specific opportunity structure, namely the Boston high-technology (high-tech) sector. The opportunity structure refers to the economic, technological, socio-economic and socio-ethnic structures of a specific context which produces a set of possible courses of action. In fact, earlier studies on ethnic entrepreneurship have demonstrated that the characteristics of the opportunity structure are crucial for understanding the strategies of ethnic entrepreneurs (Ward et al 1993, Aldrich & Waldinger 1995). This is because ethnic entrepreneurs can work only with resources made available to them by their immediate and external environment. Structural features of the environment may also impede entrepreneurs from pursuing certain tie-strategies.

When researching the social ties that Indian entrepreneurs in a knowledge intensive sector adopt to mobilize resources, I will combine the insights from inter-organizational and social network theory. While inter-organizational theory emphasises firm-to-firm relations, social network theory highlights the inter-personal ties of the entrepreneur. When used in conjunction, these two network theories provide a more holistic approach for examining the connections Asian Indians make use of in the daily operations of their firm. I have constructed four research questions that capture the type

of connections at use, and the detailed characteristics of these ties. Particularly, the questions take into consideration the influence of structural impediments in the context that will be thoroughly discussed in the background chapters and elaborated on in the theoretical framework. They also allow me to look into how the unique experiences of the entrepreneurs, as well as the technological specialization of their firms have shaped the type of connections at use. Finally, the questions enable me to examine the degree of ethnicity at play (if any) in the Indian entrepreneurs' pattern of actions. It is plausible that the ethnic composition of the sector in connection with the knowledge intensive nature of the high-tech industry may weaken the importance of co-ethnic social ties. In order to consider these issues, I have formulated the *main research question* as following:

*1) What kind of ties have Indian entrepreneurs adopted in order to stay competitive in Boston's high-tech sector?*

The *first subquestion* recognizes the particular power structure that characterizes the Boston high-tech community. Specifically, the community has been marked by a puritan industrial tradition where membership has been based on family and class background. Moreover, the numerous recessions that have hit the Boston high-tech sector have, curiously, strengthened the dominance of the established power elite. Therefore, I will take into account the high-tech community's degree of openness when researching the connections that the Indian entrepreneurs employ. Accordingly, I ask:

*a) Have Indian entrepreneurs managed to integrate a) spatially and b) socially into the local, established high-tech network?*

The *second subquestion* acknowledges that knowledge entrepreneurs typically strive to grasp opportunities from sources beyond the local to stay competitive. The fact that regions in India, such as Bangalore, Bombay and Chennai recently have evolved into dynamic and competitive high-tech districts make it plausible for Boston based Indian entrepreneurs to take advantage of transnational ties to their country of origin. Therefore, I pose the second subquestion which is formulated in two parts:



*b) Have Indian entrepreneurs developed complementary transnational ties to actors in India's high-tech regions? If yes, can these transnational ties compensate for anticipated exclusionary pressures in the local, established Boston high-tech network?*

The *third subquestion* takes into account the fact that technology intensive industries tend to produce a certain organizational structure. Since Boston's high tech sector recently has experienced a technological diversification, it is of interest to investigate if diverging technologies advance similar organizational structures. If dissimilar technologies produce slightly different organizational structures, the Indian entrepreneurs may adapt their type of social ties to the technological specialization of their firm. For this purpose, I have included interviewees from different technologies in this study. Accordingly, I ask:

*c) Have Indian entrepreneurs in this case study adapted their set of connections to the type of technology at use in their firm?*

The research questions will not only function as a tool for exploring the type and nature of the social ties at use, but will also, and more importantly, assist me in determining the kind of tie-strategies the Indian entrepreneurs in Boston's high-tech sector pursue. Significantly, the four questions will enable me to ascertain whether the social tie-strategies that the knowledge intensive entrepreneurs in this study employ differ from the social tie-strategies that traditional ethnic entrepreneurs have made use of. In order to achieve these exploratory goals, I have deliberately chosen the research design of a multiple case study. My inquiry methods include the analysis of public documents, questionnaires, in-depth interviews and complete observation.

### **Contribution to the Literature**

I have grounded my inquiries in a rich theoretical framework to demonstrate this study's relevance to the ethnic entrepreneur literature. By cementing my theoretical point of departure, I acknowledged significant gaps in the ethnic entrepreneur literature. Accordingly, my study strives to address three severe deficiencies in the literature. First and as already mentioned, my primary goal is to illuminate the strategies that ethnic

entrepreneurs make use of in a *neglected arena*, namely a knowledge intensive sector. Secondly, I have singled out an *ethnic group that lacks representation* within the American ethnic entrepreneur literature. In this study an ethnic group is defined in accordance to Olzak (1992 p 25) as a group fixed by a "social boundary based on one or more of the following criteria: a) characteristics presumed to be based upon shared genealogy, b) cultural traits, including language religion, dress, custom, or assumed shared history, and c) nationality or regional origin." Although much research has been done on other ethnic Asian groups such as Chinese, Vietnamese, Japanese and Koreans, there is essentially nothing available on Indians. Several researchers (Leonard & Tibrewal 1993, Sheth 1995) have also pointed out the need to embrace this excluded ethnic group in the scholarly literature. Finally, my research setting, namely the Boston Metropolitan area, has not been a major hub for non-European immigration flows. In contrast to traditional destinations for minorities such as New York, Miami, and Los Angeles, Boston has only recently experienced an inflow of non-Europeans. *Thus, scholars within the ethnic entrepreneur field have yet to explore the Boston metropolitan area.* The actors and the setting of this study carry the potential for advancing towards a more complete understanding of the strategies of ethnic entrepreneurs.

### **Social Relevance**

This thesis will not only attempt to take one step towards a less biased ethnic entrepreneur theory, but my study is also of immediate social relevance. The research on Indian entrepreneurs captures one instance of the contemporary social process where minorities in growing numbers are breaking out from spatially and sectorally marginalized arenas to compete with the mainstream in the most technologically sophisticated sectors of the economy (Saxenian 1999). While their ethnic predecessors in low-skilled sectors demonstrated little evidence of expansion, sectoral diversification, and use of competitive practises, the new Indian entrepreneurs are motivated by goals similar to the mainstream entrepreneur namely, innovation, growth and profit. Thus, the new Indian high-tech entrepreneurs stand out as role models not only to their own ethnic community but also to other minority groups in the US. Furthermore, their endeavors may be important for job growth and economic prosperity in the region. The National

Comission on Entrepreneurship has stated that “the benefits to us, as Americans, of entrepreneurs’ risk-filled but successful efforts to see change and find opportunities in it, to discover innovations to exploit those opportunities, and then to build and grow companies upon those innovations, is enormous”

### **The Structure of the Thesis**

I have adopted the specific structure of this thesis in order to gradually immerse the reader into the topic, the setting, and the actors, before embarking on the empirical analysis. Accordingly, the second chapter provides a brief discussion of the Asian Indian community in the Boston region. The purpose of this chapter is to construct a basic understanding of the Indian entrepreneurs by focusing on Asian Indians immigration history and selected structural features of their ethnic community. In the third chapter, I use crucial historical events as my point of departure to present a convincing picture of the high-tech sector’s contemporary production structure, power structure and ethnic composition. By highlighting specific features of the Boston high-tech sector, I strive to develop an introductory account of the opportunity structure that the Indian entrepreneurs are operating in. Together, these two chapters serve as a platform for comprehending the theoretical framework set fourth in chapter four.

The theoretical framework presents an ideal type picture of the research setting and serves as a guide to the empirical analysis. The chapter offers an in-depth conceptual discussion, supplementing the introductory chapters to provide a more holistic depiction of the opportunity structure, the actors and their potential patterns of action. It further serves to ground my research questions in social theory. I commence the chapter by clarifying the central concepts of this study. I then move on to a theoretical discussion of the organizational structure of the Boston high-tech sector, focusing attention on the increasing significance of the network form of organization, the importance of the regional environment, and vital external connections. By making explicit the organizational structure, I strive to clarify the importance of developing connections for the entrepreneurs. When discussing the actors potential patterns of action, I specifically consider the insights from inter-organizational and social network theory. I elaborate on the optimum characteristics of an actor’s ties, the ideal process of developing

connections, and plausible barriers in the context that the actors may face when developing their ties.

Having theoretically discussed the opportunity structure and the actors in detail, I move on to consider the central methodological issues of this study. The methodology chapter explains the methods of data collection and lays out the specific strategies of inquiry. It further provides a discussion on the role of the researchers. Finally, I discuss the concerns of validity and the trustworthiness of the findings.

The methodology chapter precedes the empirical analysis, the culmination of the thesis. Having gradually introduced the reader to the topic, the setting and the actors, I now present the empirical findings from my case study fieldwork. Moreover, I discuss and elaborate on the research results by systematically linking them to my research questions as well as to social theory. I commence the chapter by putting fourth significant features of the actual entrepreneurs and their firms. Thereafter, my approach follows a sequential order by first discussing the initial development of connections among the Indian entrepreneurs. I then move on to analyze selected aspects of the entrepreneurs' connections at use in the daily operations of the firms. These are the ties that are crucial for the competitiveness of their firms. I further consider the impact of technology on the entrepreneurs' role-set. Finally, in chapter seven, I return to the objective of this study. Based on the analysis of the entrepreneurs' ties, I summerize the findings and make explicit the type of social-tie strategies that the ethnic entrepreneurs in this case study have adopted in a knowledge intensive, historically unique, opportunity structure. In other words, I cement the connections between the research questions, the objective and the theoretical framework.



## **Chapter 2**

### **The Asian Indians**

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This chapter will present a brief overview of the Asian Indian community in the Boston metropolitan area. By discussing the Indian community's immigration history and selected structural features of this ethnic group, I strive to develop a basic understanding of the individual Indian entrepreneurs of this study. It should be clear however, that a characteristic of the whole population of Asian Indians may not necessarily be translated to the individual level. Nonetheless, a discussion of the Indian community might provide valuable expectations about the experiences and characteristics of the Indian actors of this study. Furthermore, a review of the Asian Community may serve to explain the actual traits of the individual entrepreneurs that will be discussed in chapter six.

#### **The Indian Community**

Traditionally, Massachusetts has not been a major destination for Asian Indians immigrants to the US. Only around 30,000 Asian Indians reside in the Boston area today, representing a minor 0.9% of the total population<sup>2</sup>. However, pan Asian groups are actually the fastest growing minorities in the area. In the city of Boston, the Asian population doubled between 1990 and 2000, and the number of Asian Indians grew by 126.4% during the same period<sup>3</sup>. Yet the increase has not been equally dramatic in the metropolitan area as a whole.

The Asian Indians that have settled in the Boston region reside close to workplaces such as high-tech firms, hospitals and universities (Sheth 1995). Moreover, their settlement pattern in the metropolitan area is a reflection of Asian Indians' general preference for suburban areas. As can be illustrated by figure one, a high percentage of Indians have settled around Route 128 (also called route 95), the high-technology highway which will be discussed in the following chapters. Furthermore, the high-tech agglomeration around Cambridge has attracted a substantial number of Asian Indians.

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<sup>2</sup> US Census Bureau 2000

<sup>3</sup> US Census Bureau 2000

This subcounty<sup>4</sup> is the sole area in the Boston region where Indians live in relative isolation from the white majority<sup>5</sup>. In all other cases they follow the scattered residential pattern of the white middleclass. As a result, Asian Indians have not established ethnic enclaves such as Chinatown or Little Korea (Sheth 1995).

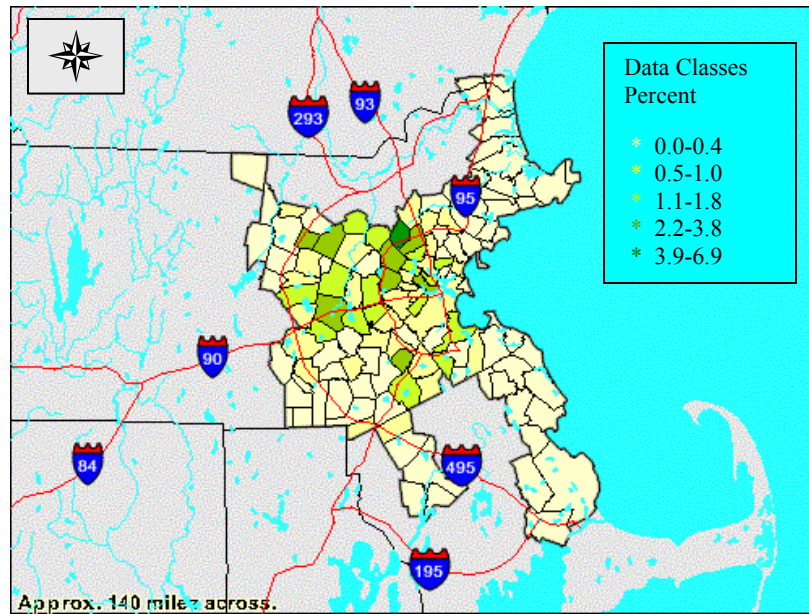


Figure 1. Percent of Asian Indians in Subcounties in the Boston metropolitan area.  
Source: US Census bureau

Asian Indians do generally not identify themselves with the Indian national origin group, but rather with a distinct subgroup reflecting regional heritage, language, diet and religion (Leonard & Tibrewal 1993). The major immigrant subgroups have mainly been from Gujarati (60%), Punjab (30%) and Kerala (10%). Furthermore, a majority has had Hindu as their first language and English as their second (Sheth 1995). Although regional subgroups may be important for cultural reasons, Leonard and Tibrewal (1993) have provided evidence for the significance of pan-Indian identity in regards to economic

<sup>4</sup>US Census bureau utilizes the terminology subcounty to describe a statistical area representing parts of a county.

<sup>5</sup> According to my calculations based on US Census data 2000 and Bluestone & Stevenson 2000

action. In other words, when Indians do business, they deliberately cross traditional, linguistic and religious boundaries in order to reach out to a wider clientele.

The immigration history of Asian Indians may serve to explain the characteristics of the community. It was the Immigration and Nationality Act of 1965 that spurred Asian, and particularly Indian, immigration to the US. The act of 1965 abolished the national origin quota system, which had been the largest obstacle for non-European immigrants. Furthermore, the US government began to allow family reunions and encouraged professionals with specialized knowledge to immigrate. Lastly, the immigration act entailed an expansion of the world coverage numerical restriction. As a result, Indians trained in such fields as medicine, science and engineering were part of a professional stream of immigrants following the Immigration and Nationality Act of 1965 (Segal 2002). In fact, India has become one of the major beneficiaries of the act, sending an average of 20,000 immigrants to the US annually (Sheth 1995). In the 1990s and early 2000s, the Asian immigrants to the US have typically been computer programmers or information scientists. Of those Indians (25 years and over) who immigrated between 1980 and 1984, 68% held a Bachelor degree and 28% had a Master's degree. Thus, the Asian Indians are exceptionally well educated in contrast to the white mainstream (20% received a Bachelors degree and 7% a Master's degree) and other minority groups (Sheth 1995). Furthermore, the lack of quality graduate programs in India have spurred Asian Indians to travel abroad to enhance their own professional career. In most cases, these students never return to India permanently, but find positions in the US and transfer their student visas to permanent resident status (Segal 2002). Nonetheless, they typically maintain strong ties to India through frequent trips to their home country (Saxenian et al 2002). Extraordinary educational levels, professional success and a high female labor participation rate have merited the Asian Indians with a median income exceeding the white majority. Accordingly, Indians are perceived as the 'model' minority in Massachusetts and all over the country. In Segal's words (2002 p. 159):

"The general public's overwhelming perception of Indians is that they constitute a model minority, are professionally successful and, according to their own cultural notions of health, are well adjusted both emotionally and mentally"



However, being a successful minority is simultaneously admirable and threatening to other ethnic groups, including the white mainstream. Further intimidating, is the fact that Asian Indians are among the fastest growing ethnic groups in the Boston area. Bluestone and Stevenson (2000), for example, have revealed that close to 30% of the white mainstream in the greater Boston region worry about competition from Asians. This perception, namely that one group's gain is another group's loss may result in a motivation to discriminate against Asian Indians. Despite their fluency in English and exceptional educational attainments, Asian Indians are underrepresented in managerial and other positions of authority (Sheth 1995). Moreover, Asian Indians are paid significantly less than their white counterparts in similar occupations. They further continue to believe they have to surpass the white majority in credentials in order to compete for jobs. Finally, a report from The Center for Urban and Regional Development (2000) at the Northeastern University of Boston claims that discrimination is a crucial factor in explaining the low market shares of ethnic minority business in the Boston area<sup>6</sup>.

### **Concluding Remarks**

This chapter has presented an overview of the structural characteristics of the Asian Indian community in the Boston region. The specific characteristics of the community make it interesting to look into the traits, experiences and adjustments of the *individual* Asian Indian high-tech entrepreneurs. The brief discussion above results, for example, in an immediate interest to investigate the particular immigration path of the Indian entrepreneurs in this study. The Indian community's immigration background has demonstrated that 'period of immigration' has consequences for both educational levels and socio-economic background. Moreover, it is significant to focus attention on the Indian entrepreneurs' group identification. Do they conform to the general pattern of keeping up strong ties to their local Indian community? Have they nurtured their connections to fellow Indians in their native country? Additionally, it is intriguing to research whether the Indian entrepreneurs have encountered barriers to prosperity. Have they been subject to discriminatory processes due to group-competition? These individual

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<sup>6</sup> [www.neu.edu/curp](http://www.neu.edu/curp)

traits and experiences of the Indian entrepreneurs are likely to directly shape the kind of connections they make use of, and indirectly, to influence the sort of social tie-strategies they adopt.



## **Chapter 3**

### **The Boston High-Tech Sector**

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The previous chapter discussed the Indian community in the Boston metropolitan area in order to develop a basic understanding of the Indian entrepreneurs that are the focus of this study. In a similar way, the current chapter will provide an introductory description of the opportunity structure that the Indian entrepreneurs are operating within. This brief overview of the Boston high-tech sector will function as a platform for understanding the theoretical discussion of the opportunity structure. The point of departure for the chapter will be the historical conditions that have influenced the contemporary production structure, the power structure and the ethnic composition of this flourishing, entrepreneurial milieu.

#### **A Brief History**

The Boston metropolitan area, located within the boundaries of the six counties of Suffolk, Middlesex, Essex, Norfolk, Bristol and Plymouth (see yellow marked map in figure 2), has a long history of innovative activity. The Boston region pioneered manufacturing techniques and equipment in the textile and the machine tool industry, as early as the nineteenth century. Since then, institutions such as the Massachusetts Institute of Technology (MIT) has supported the innovative tradition. MIT has not only fostered technical research and development but it has also encouraged the commercialization of special techniques and products developed in its laboratories. The specific policy combination that MIT has adopted, namely a strong collaboration with industry, has made it the most critical institution for the development of the innovative high-tech sector in the Boston metropolitan area. (Roberts 1991).

The scope of the innovative high-tech sector, however, has not always been as extensive as today. Before the World War II, the sector consisted of only a few successful firms like Raytheon, The Bell Telephone company and EG&G, among others. Due to the development of the telephone, the radio and the refrigerator within these firms, science

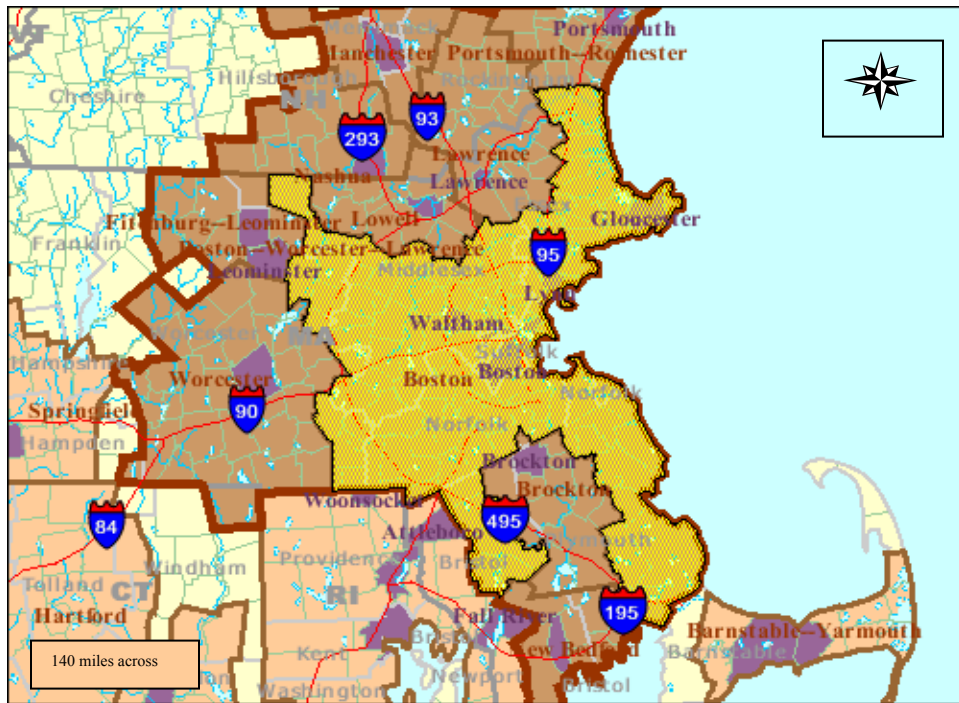


Figure 2. The Boston metropolitan area. Source: US bureau of the Census

and research slowly began to gain a public recognition in the area. Because of US involvement in the Second World War, the importance of high-tech industries drastically increased. Vannevar Bush, the MIT professor and director of weapons development for the US government, ensured that a majority of military contracts were distributed to firms, research institutions, labs and universities in the Boston region. The most notable beneficiary was MIT, receiving \$117 billion in funds, representing 1/3 of all military contracts awarded in the US. Local firms, such as Raytheon also grew dramatically as a consequence of military contracts, increasing its sales from \$3 million to \$173 million between 1940 and 1945 (Rosengrante & Lampe 1992). When World War II drew to an end, the Boston metropolitan area, containing the academic institutions of MIT, Harvard, Northeastern, Tufts and Boston University as well as a concentration of industrial labs, offered an intellectual and technological labor pool that was unsurpassed in the nation (Saxenian 1994).

During the post-war era, an information and technology highway was built around the city of Boston to make space for the increasing numbers of firms that wanted

to locate in the area. Surprisingly, Route 128 became so heavily congested with firms that new ventures were forced to allocate along route 495 and 93 and move back into areas such as Kendall square. The growing number of firms were partially spurred by the founding of the first public venture capital firms. The American Research and Development firm (ARD) was a builder and creator of new companies with innovative technologies. By the help of advisors from MIT and Harvard, the ARD invested in enterprises having a technically superior product with a potential of being commercialised (Etzkowitz 2002). Besides the ARD, Boston's high-tech firms also benefited from the presense of private investors and bankers. The First National Bank of Boston and New England's Merchants Bank began lending money to newly fledged firms based on their past contracts and funding. Furthermore, the Brahmin families of Boston, as well as members of the Eastern elite like the Rockefellers, the Whitneys and the Mellons, got personally involved with the high-tech businesses in the region (Roberts 1991).

The success of this era was followed by a deep nationwide recession that hit Boston's high-tech sector harder than any other high-tech agglomeration in the country. The region's old manufacturing base fell apart and the unemployment rate rose above the nationwide average to 12,3 at its peak, wiping out a large number of jobs within the high-tech sector. Changes in federal spending which had previously benefited Boston's high-tech sector, was partly responsible for the economic downturn. Finally, the state of Massachusetts increased its capital gains tax in 1969, from 25% to 49%, making it less attractive for venture capital firms to make high-risk investments (Rosengrante & Lampe 1992). When taken together, these factors resulted in a major crisis for the high-tech sector, making scientists and engineers, as well as entire firms, leave the Boston area to seek opportunities in more prosperous high-tech regions, like Silicon Valley. The Boston metropolis had been far too dependant on federal funding and military contracts and the recession made high-tech companies reconsider their strategies.

Even though the economic downturn had been detrimental for Boston's high-tech sector, the entrepreneurial productivity in the area had not totally vanished. Over 600 small high-tech companies, relying on their own funding were founded during the years of the recession (1970-1975). Furthermore, Kenneth Olsen, CEO of the Digital Equipment

Company, developed the first fully compatible, networked minicomputer in this time-period (Kenney & VonBurg 1999). In 1980, the Boston area had captured 70% of the \$ 9 billion minicomputer industry and the six biggest minicomputer firms: DEC, Data General, Wang, Honeywell, Prime and Nixdorf, were located in the region (Saxenian 1994). The concentration and interaction between high-tech companies, academic institutions and industrial labs constantly resulted in new spin-offs based on new innovative ideas.

As the 1970s drew to an end, the region was booming as the fastest growing sector of the computer industry. However, the success of the commercialisation of the minicomputer resulted in the Boston high-tech firms missing the importance of the microcomputer and the workstation industries. These personal computers were smaller and cheaper, but had the same capacity as the minicomputer. In less than three years the minicomputer industry lost 40,000 jobs and the unemployment rate rose again, far over the national average (Rosengrant & Lampe 1992). This second downturn was worsened by the prosperity that had preceded it, as well as by the fact that it hit the high-tech sector's very core products and services.

While the minicomputer and military electronics industries decayed during the second recession, some firms within other high-tech industries, namely medical devices and software, continued to show signs of growth. However, these companies were both started, and run, from a much smaller financial base. The software industry grew prominent due to improvements and changes in the relation between hardware and software. During the 1970s boom, minicomputer firms had established a proprietary system, where they tried to keep customers dependant upon in-house-developed products by producing software that was not compatible with other manufacturer's products. With the development of the personal computer, however, a trend towards open system architecture emerged. (Bathelt 2001). The growing importance of software has been crucial to the recovery of the high-tech sector in the Boston metropolitan area.

### **The Contemporary High-Tech Sector**

As a result of historical trends, the contemporary structure of the Boston high-tech sector appears strikingly different from its status a couple of decades ago. Large firms that were the force behind the minicomputer industry, is no longer characterizing the sector. In fact, Massachusetts software firms, which are mostly concentrated in the Boston metropolitan area, are particularly small. 52 % of the firms employ ten or fewer people, while 72% employ 25 or fewer (see also table 1). Today, these smaller software firms are the greatest driver of the high-tech sector (Greater Boston Chambers of Commerce 2001). The downsizing of firms in Boston's high-tech sector further indicates that an entrepreneur is in need of less capital today, than a decade ago, when launching his firm. As a result, the number of software establishments in the Boston area has tripled between 1987 and 1997. Moreover, the industry added 10,000 new jobs in 1999, and 15,000 in 2000 (Massachusetts Software and Internet council 2001). To some extent, the software industry has been able to compensate for the decline in the hardware industry that used to be at the core of the high-tech sector in the 1980s. Former hardware producers, like DEC and Wang, have managed to restructure their production schemes and extend their activities into software production. In terms of specializations, most companies tend to provide a product, often combined with a service, in the following areas of application development: business, database and customer management; financial, banking and investment management; medical healthcare, scientific and engineering management; and internet products and services (Massachusetts Software and Internet Council 2001).

A report from The Center on Urban and Metropolitan Policy (2001) focus attention on the importance of software industry in Boston's high-tech sector by referring to important indicators such as employment patterns, patent activity and venture capital flows. As shown in table one, the Boston Metropolitan area is home to almost 9,700 software companies. Furthermore, the industry employs over 65,200 people. However, if we consider absolute employment numbers on their own, they are not a sufficient indicator of the importance of various high-tech industries. Only in conjunction with location quotients are they able to reveal the relative specialization of an area in a particular industry. A quotient greater than one demonstrates that the area has a higher concentration of firms in that particular industry than the rest of the nation. The location



Table 1. Firms and employees in the high-tech industries in the Boston metropolitan area

	Establishments	Paid Employees
Hardware	756	71715
Electrical Equipment	892	24668
Engineering Services	44207	73051
Instruments	547	19127
Software	9690	65237
Telephone Communications	281 <sup>7</sup>	11196-12695
Transportation	135	7538
Total	56508	253955

Source: 1997 Economic Census, US Census Bureau

quotients confirmed the significance of software<sup>8</sup> for the Boston metropolitan area, indicating numbers as high as 4,8 for the industry. In contrast, the hardware industry held location quotients just above 2.0. Furthermore, the software industry dominates the relative measure of patents issued in various high-tech industries. Since patents measure the ability to develop breakthrough technology, which is essential to sustaining competitiveness in the high-tech industries, they provide a good assesment of the relative importance of software for Boston's high-tech sector. Finally, venture capital had a tendency to flow to start-ups set in the software industry.

As shown above, the software industry has been crucial to the revitalization of Boston's high-tech sector. Yet, the upturn has not simply been based on one industry, but rather on a technological diversification of the sector (Bathelt 2001). For example, table one indicates the increasing importance of high-tech services (engineering services). Moreover, the instrument industry survived the recessions by specializing in technologies such as measuring and control instruments, as well as optical, medical and surgical instruments. Thus, as a consequence of their independence from the minicomputer industry, the downturns have only had a limited impact on the productivity in the instrument field. Today, approximately 75% of the total supplies of all instrument firms

<sup>7</sup> Numbers are underestimated due to the fact that the US Census Bureau lacks numbers of firms without paid employees.

<sup>8</sup> The center on Urban and metropolitan Policy has a slightly different definition of the software industry than the author of this thesis has. However, these numbers can still give us a picture of the relative concentration of the two industries.

are acquired locally (Bathelt 2001). In contrast to the instrument industry, the electronic components industry was heavily reliant on the mini-computer's success. Initially functioning as the supplier base to the mini-computer industry, these firms have been forced to totally restructure their production programs. In fact, the industry as a whole has demonstrated the remarkable capabilities of acquiring new customers and entering alternative markets, resulting in an increase in employment between 1992 and 1997 (Bathelt 2001). As a whole, the high-tech industry is finally showing signs of growth again, after another minor downturn in the early 2000s.

### **Features of the Contemporary High-Tech Community**

By describing the historical and contemporary Boston high-tech sector, I not only want to demonstrate that the sector repeatedly has gone through radical changes, but I also hope to illustrate that it has the ability to successfully recover from severe economic downturns. More importantly, the long tradition of regionally grown high-tech industries in conjunction with triumphant restructuring has resulted in a tightly knit community of high-tech firms, universities and research institutions that simultaneously cooperate and compete. Apart from a few exceptions, the closely connected actors in the sector have entirely consisted of the white, male elite. In the 1980s, only 6,7% of the state's labor force was made up of minorities. In fact, the under representation of minorities was extreme in knowledge intensive industries, such as the high-tech sector (Dorfman 1988). Accordingly, the historical economic cycles of the high-tech sector have united the *white*, elite actors closely together. Rosengrant and Lampe (1992), for example, describe the connections between the academic and industrial research communities as well as between CEOs from various high-tech firms as an "old-boy network". From a general understanding of the literature, I interpret this network to consist of New England conservatives and their white family friends, educational peers and colleagues (Lampe 1988, Saxenian 1994, Lampe & Rosengrant 1992, Leonard-Barton 1984 & Nohria 1992). Thus, the tightly knit high-tech community of white elites, as well as the puritan industrial tradition of Boston where identity is based on family and class background, has made it severely difficult for minorities to establish their firms in the area. In contrast to Silicon Valley, where various minority groups, such as Chinese, Indians, Israelis and

Europeans have helped to keep the area at the forefront of technology (Saxenian 1998, 1999 & 2002), the Boston high-tech sector has stayed persistently homogenous. Moreover, taking into consideration the large number of Asians with engineering degrees, it is surprising that entrepreneurs in the Boston software industry share the typical set of characteristics: white and male (Donald et al 1998). In fact, minorities are the owners of only 4% of the software companies in the entire state of Massachusetts<sup>9</sup>. Nonetheless, attempts are continually being made to speed up the process of changing attitudes towards minority entrepreneurship and minority career development in general. The cooperation between The Greater Boston Chamber of Commerce and The Partnership to "promote the placement, retention, and career development of minority professionals.... and promoting diversity in every aspect of its work, and throughout the business, government, and civic life of greater Boston" can serve as an illustration of these attempts (The Greater Boston Chamber of Commerce 2001 p. 26). Hence, in the past years the sector has experienced a growing number of Black and Asian minorities becoming technological entrepreneurs (Roberts 1991, Tang 1995).

As illustrated in figure three, Asian entrepreneurs make up an estimated 3.5% of the total numbers<sup>10</sup> of high-tech entrepreneurs in the Boston Metropolitan area. In a similar way, Black-Americans represented an estimated 2%. The overrepresentation of the white majority (93%) is a striking feature of the ethnic composition of the Boston high-tech sector. This study's focus on Asian Indians results in an immediate concern to make explicit the percentage of Indian entrepreneurs in the Boston high-tech sector. As elucidated by the inset in figure three, the estimated 3.5% of Asian entrepreneurs are predominantly distributed between Chinese, Asian Indians, Japanese and Koreans. Asian Indians are the second largest group of Asian entrepreneurs in the high-tech sector, making up a total of 22%. Furthermore, the Chinese represent around 45%, the Japanese 16% and the Koreans a miniscule 5% of the total Asians. Finally, other Asian groups, too small to be accounted for individually, together make up around 12% of Asian entrepreneurs.

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<sup>9</sup> Massachusetts Software and Internet Industry Analysis 2002

<sup>10</sup> Due to the nature of the US Census bureau's variables in the PUMS 2000, Hispanics are not included in the total numbers of entrepreneurs. However, since hispanics have little impact on the high-tech industries, this fact does not significantly alter the shares of high-tech entrepreneurs.

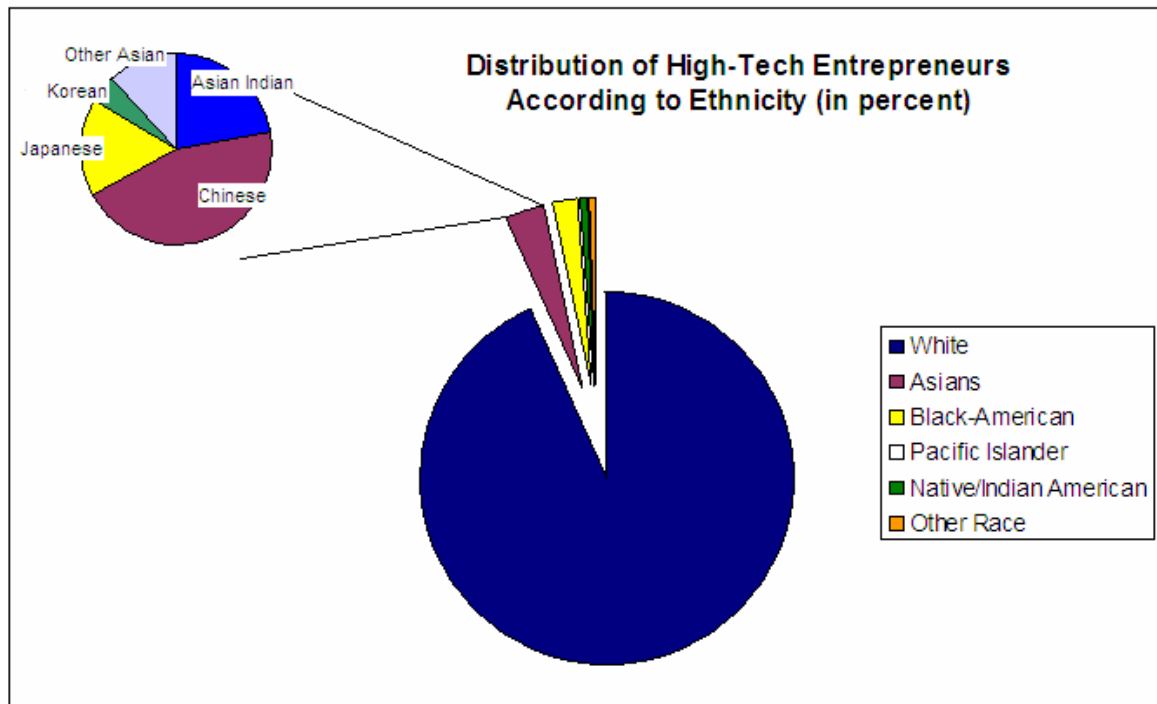


Figure 3. The ethnic composition of the Boston high-tech Sector. Source US Census Bureau 2000<sup>11</sup>

In contrast to the trend among ethnic entrepreneurs, Asian Indians have not developed an ethnic high-tech niche where they have clustered. An ethnic niche is a concentration of an ethnic group in a particular industry, relative to the concentration of the total population of entrepreneurs in the same industry (Razin & Light 1998). Nevertheless, they have demonstrated a preference for software and engineering services. This concentration also resembles the patterns of the white majority's specialization. Figure four illustrates that an estimated 28% of all Asian Indian entrepreneurs are operating within the software industries, compared to 23% of their white counterparts. Furthermore, the concentration of 59% Asian Indians in engineering services is roughly proportional to the clustering of Whites (69%) in the same industry. In contrast to the white majority, however, the Asian

<sup>11</sup> See appendix 3 and 4 for a discussion of methodology and the results of the tabulations of the data. Note that I have used 'self-employed' as an approximation for entrepreneurs. This leads to a significant undercount of entrepreneurs due to the fact that so many firms are funded by outside funds or venture capital and thereby not owned by the founding entrepreneur.

Indians are completely absent in the following three high-tech fields: instruments, transportation and computers/hardware.

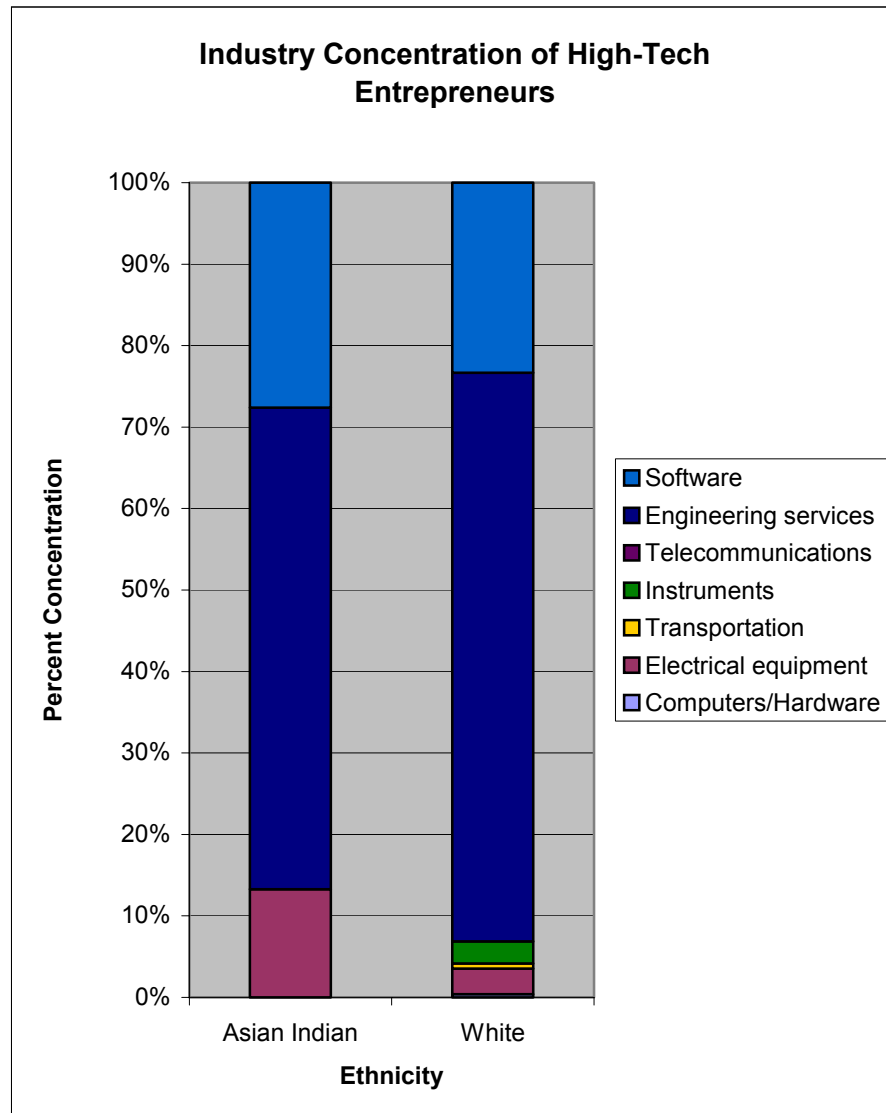


Figure 4. Industry concentration of white and Asian Indian entrepreneurs.

### Concluding Remarks

This chapter has served as an introduction to the high-tech sector and will facilitate the understanding of the following theoretical discussion. By illuminating selected events in the history of the Boston high-tech sector, I have sought to explain the characteristics of the contemporary opportunity structure. I have demonstrated that the sector experienced a

technological diversification and a shift to software as its' core industry during the last decade. Moreover, the downsizing of firms have moderated the start-up requirements for prospective entrepreneurs. Significantly, I have discussed the ambiguity that particularly distinguishes the Boston high-tech sector. On the one hand, the Boston high-tech community has demonstrated a remarkable flexibility and capability to adapt to fluctuations in the global market. On the other hand, the community has embraced its puritan industrial tradition and remains hesitant to accept both ethnic and social diversity. I have suggested that the high-tech sector's very ability to collectively adjust to historical downturns may partially explain the persistence of its social conservatism. More importantly, it is in this *tightly knit* sector, dominated by *white*, elitist, regionally anchored high-tech actors that the new Asian Indian entrepreneurs have launched their firms. The existing power relations and the ethnic composition of the Boston high-tech sector may theoretically be perceived as a structural facet, namely, a patterning of social phenomena (Peet 1998). The role of structure is typically one of confronting a certain individual with a characteristic set of impediments (Ibarra 1993). In this study, the extent to which minorities, and especially Indians, are present in the high-tech sector is a structural characteristic of the societal situation that may hinder the Indian entrepreneurs from relying on co-ethnic connections. Moreover, the sector's domination by the white, male, elite may prevent the Indian entrepreneurs from naturally integrating into the local high-tech community. In other words, and as will be elaborated on in my theoretical chapter, these structural factors, may have implications for what kind of business and professional contacts Indian entrepreneurs are able to develop.



## Chapter 4

### Theoretical Framework

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While the previous chapters have provided a background to the Indian entrepreneurs and the Boston high-tech sector, this chapter will discuss the theoretical framework directing this thesis. It will further present an in-depth theoretical elaboration on crucial relationships and processes underpinning this study. My aim is to offer an ideal type picture of the context, the actors, different aspects of the actors' relations and their plausible patterns of action. The ideal type picture will serve as a platform for understanding why I have chosen the specific research questions, laid out in chapter one. In other words, I will ground my research questions in social theory. However, I will set out by clarifying central concepts of this thesis, namely the entrepreneur and the *ethnic* entrepreneur. I will then move on to discuss, theoretically, the organizational structure of the high-tech sector highlighting factors such as the increasing significance of the network form of organization, the importance of the regional environment, and the necessity of external connections. These factors will shed light on why connections have become vital for the individual entrepreneur. Furthermore, I will theoretically elaborate on the entrepreneurs' type of connections and the prospective characteristics of these immediate ties. Finally, the ideal process of developing connections, and the general and unique barriers that Indian entrepreneurs may face will be discussed.

#### The Entrepreneur Concept

Joseph Schumpeter (1934) was among the first scholars to theorize about the entrepreneur concept. He saw the entrepreneur as an innovator, or someone who tries to do things in a new and unexplored manner. In his book, *The Theory of Economic Development* (1934 p. 75), he argues that "it is the carrying out of new combinations that constitutes the entrepreneur". He further emphasized the important difference between 'entrepreneurs' and 'capitalists'. While the entrepreneur brings about new combinations in the means of production, the capitalist bears the financial risk. According to



Schumpeter (1934 p. 66), the entrepreneur may revolutionize the patterns of production through five different ways:

- 1) The development of a new product
- 2) The discovery of a new production method
- 3) The discovery and exploitation of a new market
- 4) The discovery and exploitation of a new source of supply or raw materials
- 5) The introduction of a new organization in a new industry

By using terminology such as revolutionize, discover and exploit, I seek to stress the great importance Schumpeter attached to radical innovation when developing the entrepreneur concept. Schumpeter proposed that an entrepreneur is someone who *drastically transforms* the existing supply and demand patterns (Schumpeter 1934 & Singh 2000). While Schumpeter focused on the importance of innovation, he also called attention to the significance of long-term extensive economic growth for an entrepreneur's endeavors. This point has been interpreted as an indication that Schumpeter's concept is anchored in the private sector of the free market economy (Kent et al 1982). Finally, Schumpeter recognized that entrepreneurs remain entrepreneurs as their role changes from setting up a new venture to acting as the owner-manager of the firm. This is due to the necessity of further innovations and adaptations.

Harwood (quoted in Kent et al 1982) has argued that a Schumpeterian definition of the entrepreneur, anchored in the free market economy, is too restricted for the emergence of prospective research in underdeveloped and centrally planned economies. He further claims that any definition of the entrepreneur must simultaneously consider the popular usage of the concept and hold on to its historical innovative roots. The concept 'entrepreneurial event' encompasses any role associated with initiative, risk-taking, resource aggregation and autonomy, and is introduced as an attempt to solve this problem. However, this liberal definition has a tendency to include everything from street performers to high-tech innovators, and may thus make explanations severely unwieldy.

Another alternative to Schumpeterian's innovator has been the entrepreneur as a risk taker. This particular perspective derives from Richard Cantillon and was developed

a century before Schumpeter's well acknowledged definition. Cantillon argued that the uncertainty the entrepreneur primarily has to cope with is the risk of purchasing goods at a certain price and selling at an uncertain price. Hence, to Cantillon, the entrepreneur very much resembles a traditional merchant. While Cantillon's original definition of the entrepreneur was far too broad, later improvements have made this approach more workable. Knight (1921) for example, has suggested that the entrepreneur concept involves calculating and taking the risk, as well as being responsible for the resulting outcomes. The literature on ethnic business has specifically focused on the dimensions of risk when defining the entrepreneur (See for example Harisson 1995, Aldrich & Waldinger 1990, Light & Gold 2000). Rather than breaking new ground in the production processes, most entrepreneur's solely take the risk of replicating and setting up a new firm. To Aldrich and Waldinger (1990), the Korean immigrant who starts up the third beauty salon down the street is still an entrepreneur.

The understanding of the entrepreneur as a resource allocator is closely related to Aldrich and Waldinger's definition. The launching of a firm does not only involve direct risk taking but also requires the assembling and co-ordination of resources. Casson (1990) has argued that the factor that set the entrepreneur apart is the ability to make intelligent decisions about the best allocation, use, and co-ordination of scarce resources. In contrast to Schumpeter, Casson does not distinguish between the capitalist and the entrepreneur, but claims that the entrepreneur must both *control* and coordinate resources.

Without innovativeness or novelty as part of the definition of entrepreneurship, the boundary between the manager and the entrepreneur is blurred. Yet, the requirement of radical innovation that Schumpeter calls for excludes individuals taking advantage of incremental innovation. According to Schumpeter's definition, Steve Jobs, the innovator of the first personal computer would be considered an entrepreneur, but not those hundreds of individuals who profit from significant improvements of the computer. In contrast, I argue that even those individuals altering a product or a process should be entitled entrepreneurs. Thus, in accordance with Vesper (1996), I integrate both the incremental and radical aspects of innovation in the entrepreneur concept. Accordingly, an entrepreneur is simply someone who, in an innovative manner, transfers value from a

technological realm to an economic sphere. In other words, any individual who launches a new venture, based on minimal or revolutionizing innovation, is considered an entrepreneur. Naturally, this definition of the entrepreneur also includes aspects of risk taking and the assembling and co-ordination of resources.

### **The Ethnic Entrepreneur**

The Indian entrepreneurs that are the focus of this study, are not only innovative individuals who share the experience of launching a firm. They also belong to a subgroup of *ethnic* entrepreneurs that slightly diverge from the mainstream. What specifically distinguishes this subgroup is their common status as 'outsiders', resulting from an immigration or minority background. The literature on ethnic entrepreneurs has indicated that 'outsider' groups pool resources within the community in order to acquire the same benefits that the mainstream enjoy (Waldinger et al 1990, Waldinger 1995, Razin & Light 1998, Light & Gold 2000). Thus, ethnic entrepreneurs typically use some kind of resources deriving from their co-ethnic community. Furthermore, the reliance on community resources vary from group to group depending on how recent they immigrated or the severeness of the discriminatory pressures they encounter. In other cases, ethnic entrepreneurs simply draw on community resources in order to maximize rewards (Light & Gold 2000). Waldinger et al. (1990 p. 52) has suggested the following definition of an ethnic firm:

"A business whose appropriator has a distinctive group attachment by virtue of self-definition or ascription by others"

This study will be based on a slightly specified version of Waldinger's definition, namely by focusing on the ethnic group attachment instead of 'distinctive group attachment'.

Most studies on ethnic entrepreneurship have followed the sectoral concentration of ethnic firms and have thereby focused on low-skilled enterprises in manufacturing service or retail industries. Razin and Light (1998), for example, have noted that ethnic entrepreneurs in metropolitan areas in the US tend to concentrate in certain entrepreneurial niches where they compete by taking advantage of co-ethnic resources. Other studies demonstrate that ethnic businesses often arise where there is a demand for

ethnic goods that the mainstream cannot provide (Halter 1995, Aldrich & Waldinger 1990). The extreme example has been the ethnic enclave, where immigrants or minority groups concentrate spatially and build up a separate labor market in order to avoid the penalties of the mainstream secondary market (Portes & Manning 1986).

This particular study on Indian entrepreneurs represents a rather different situation where ethnic entrepreneurs have made a break out from spatially and ethnically constricted low-order markets, such as the ethnic enclave. Entry into the mainstream high-tech sector not only necessitates professional skills, but also financial capital far exceeding the assets required to set up a beauty salon or a retail firm. Therefore, I expect the Indian high-tech entrepreneurs to share much with their fellow white high-tech entrepreneurs. Yet, and as we shall see later in this chapter, ethnic entrepreneurs may encounter unique problems and obstacles.

### **Organizational Structure**

When discussing the organization of the Boston high-tech sector it is crucial to note that economic actions (as well as other types of actions) are embedded in structures of social relations (Granovetter 1985). Along those same lines, certain forms of economic actions are specifically social (Granovetter 1985 and Powell 1990). and require both a broader and deeper set of ties due to the uncertainties and complexities of the exchanges. I assert that this 'extra social' network form of organization stretches beyond markets and hierarchies, constituting an extraordinary form of coordinating economic activity (Powell 1990). While markets offer short, simple and flexible communication, networks are able to transfer complex technological information and know-how based on a deeper trust and reciprocity. In a similar way, networks are not as unwieldy, and resistant to change as the hierarchical structure are (Powell & Smith-Doerr 1994).

The hierarchical structure was ideal for the system of mass production, requiring large numbers of goods and services of a given quality (Saxenian 1991, Powell 1990). Hierarchical organization not only meant that firms developed and produced all their critical components internally, but also entailed a particular firm structure based on clear lines of authority, and limited cooperation between departments. This mode of

coordination was considered the most efficient under stable external conditions, as well as in situations that required a high level of secrecy, such as defense related production.

As a result of global forces, however, competition has increased and entrepreneurs and their firms now have to bring products to markets faster than ever before. This shortening of product life cycles in conjunction with rapid changing technology, and diversified markets, make it impossible, even for the biggest firms, to autonomously stay at the forefront of technology (Cooke & Morgan 1993, Saxenian 1991, Freeman 1991, Tödtling 1994, Powell, 1990). In addition, large hierarchical firms have proven to be too rigid for contemporary market fluctuations. Therefore, we have seen a downsizing pattern where large hierarchical corporations lay-off personell in order to improve their ability to respond to competitive changes. Simultaneously, there has been an increase in the number of *small* spin-offs and start-ups (Sengenberger & Pyke 1992). Yet, more important than the shrinkage of large scale organizations has been the searching for new methods of collaboration among former contractors and competitors. During the past decade, producer and supplier relations have drastically changed and are increasingly becoming equal, involving joint development and production processes (Saxenian 1991). Suppliers are perceived as long time partners with mutual dependencies. In a similar way, former high-tech competitors are now cooperating, resulting in blurred firm boundaries and a shared interest in each other's survival. However, not only firm-to-firm relations have increased in importance but institutions and organizations have also become crucial actors in the network, assisting in spreading information and collaborating on innovative activity. For example, innovative activity has turned into a collective endeavor between entrepreneurs and their firms, universities and research labs, as well as public institutions. This type of collaboration has been particularly prevalent within information technology, and fields strongly dependent on these industries (Powell & Smith-Doerr 1994). The characteristic of innovative networks may further vary between being relatively informal, decomposable and recombinaable, to strong systems of relations lasting many decades. Debresson and Amesse (1991) suggest that no high-tech firm can survive today, without being part of an innovation network. Moreover, innovative high-tech firms need a range of "information ties" to research institutions, universities, and other firms in order to recruit competent employees, keep abreast of 'best practice' and organizational policies.

The uncertainty of the high-tech sector rising costs of product development and the tendency for complex know-how to be embedded in human beings make network forms of organization more advantageous than both markets and hierarchies. According to Powell (1990 p. 303) networks are "lighter on their feet" and may distribute the high risk of new product development among a multitude of actors. In a similar way, the ties in the network are typically durable relations to specific actors, and therefore allow a better knowledge of the capabilities and reliabilities of partners, as well as the quality of the exchanged recourses. Furthermore, being part of a network may equip actors with a common understanding of technological problems and result in mutual learning and super-additive gains (Debresson & Amesse 1991). Thus, entrepreneurs in a high-tech sector do benefit from the network mode of organization.

In the Boston high-tech sector, this "extra social" network form of organization, described here, has emerged as a response to the merciless recessions discussed in chapter three. A quotation from Best (2000 p. 461) can further illustrate this point.

"What is remarkable about route 128 has been the pace and extent of organizational change from the old, closed system to a new, open-system model of technology management and business organization. The speed of change and vitality of the resurgence can be explained in terms of development and diffusion of the new principle of systems integration within a unique 'virtuous circle of regional dynamics'."

In Best's statement on the 'virtuous circle of regional dynamics' he also emphasizes the increasing significance of the regional environment. Due to the following factors, relationships between actors benefit considerable from geographical proximity:

- 1) The transfer of complex technological information and know-how is facilitated by a common understanding and face-to-face contact
- 2) The need to cooperate with and follow up suppliers and customers
- 3) Trust is developed by repeated interactions and a common cultural background and thereby reduces uncertainties
- 4) Advice, support, and information can be drawn from regional institutions, and universities, responding to a 'regional mission' (Tödtling 1994)

The scholarly literature also focus attention on the fact that regional ties seems to be of greater importance in certain stages of the firm, such as the early growth period (Nohria

1992, Larson & Starr 1993, Tödtling 1994). Of particular value is the intensity of relations to venture capital firms, universities, research institutions, suppliers and customers. Yet, geographical proximity is critical for firms in all stages, dealing with practical, production related issues and innovation. Morgan and Cooke (1993) mention for example software designing as an industry that requires a high degree of face-to-face ties. However, in the case of the Boston's high-tech sector, Best (2000 p. 465) has argued that innovative activity is more dependant on regional actors than any other production related activity:

"Route 128 have developed regional innovation capabilities embedded in virtual laboratories in the form of broad and deep networks of operational, technological, and scientific researchers which cut across companies and universities."

Yet, the regional environment is not only of practical relevance, providing the entrepreneur and the firm with supplier and customer ties, innovation collaborations, and practical know-how embodied in local employees. It also has a bonding function. Network forms of organization will best flourish in an environment where agents share some kind of common background (Powell 1990). Portes and Sensenbrenner (1993) suggest that the more homogenous a group is, the easier it is to develop ties of mutual trust. As discussed in chapter three, the local entrepreneurs in the Boston high-tech sector have mainly been white, males from higher social classes. Even though the composition of the sector is starting to change, resulting in a growing number of minority entrepreneurs, the setting largely remains ethnically and culturally homogeneous. Moreover, the sector does not only have a long tradition of innovative activity but is also centered around crucial educational institutions, such as MIT, Harvard, Northeastern, Boston, and Tufts Universities. Finally, many entrepreneurs share similar professional experiences by starting their careers in a research environment, followed by consulting activity, before launching their own firms (Corman et al 1988). Thus, the development of the network form of organization in the Boston high-tech sector has been eased by a shared ethnic, cultural and geographical affiliation. In fact, Bathelt (2001 p. 309) demonstrates that even in diverse high-tech industries, entrepreneurs share the same local identities upon which relations of trust can be built:

”It is clear, however, that even technologically unrelated industries share the same regional lifestyle and socio-cultural characteristics, as well as organization principles and manufacturing traditions.”

Accordingly, I see a striking resemblance between the sector’s organizational features and an industrial district. I understand that the original development of the industrial district concept, drawn from case studies in ‘third Italy’, might diverge from the specific case of the Boston high-tech sector. In contrast to the historical development of close ties in ‘third Italy’, the Boston high-tech sector has only recently developed this ”extra social” organizational structure as a response to increasing competition. Furthermore, the Boston high-tech network is not as tightly knit as ‘third Italy’. Yet, due to the development and expansion of the industrial district concept, incorporating different ‘types’ of industrial formations in various countries such as Germany, Switzerland, Japan, Sweden and the USA (Nakano 2002, Glasmeier 1991, Johannisson 1994, Grabher 1993, Saxenian 1994), I claim that it’s plausible to compare the contemporary structure of the Boston high-tech sector with an industrial district. Furthermore, Sengenberger and Pyke (1992) discuss organizational form, entrepreneurial dynamism, a skilfull and adaptable workforce, and geographically bounded trust, as key characteristics of an industrial district. As illustrated above, as well as in chapter three, these features are all present in the Boston high-tech sector.

Portraying the contemporary Boston high-tech sector as a connected industrial district with high levels of local supplier, information, and innovation linkages provides a starting point for my analysis. Yet failing to consider the embedded *external* relations extending beyond the region’s boundary, will result in an imprecise depiction of the high-tech sector. Following Markusen, (1996 p. 309) I claim that industrial districts ”cannot be studied by focusing only on local institutions and behaviors, because their companies (through corporate relationships, trade associations, trade, government contracts) workers (via migration and international unions) and other institutions (universities, government institutions) are embedded in external relationships – both cooperative and competitive – that condition their commitment to the locality and their success their”. Thus, even when economic activity seems to be spatially clustered, a more thorough investigation of the



industrial district may reveal that the actors rely on numerous sites, institutions and connections which do not just stretch beyond the district but partially constitutes it. Moreover, knowledge intensive entrepreneurs are among the most widely connected and mobile people, constantly on the move and dependant on distanced relations sustained by the new digital and fiber-optic technologies (Amin & Thrift 2002). Significantly, Saxenian (1998, 1999) has demonstrated that immigrant high-tech entrepreneurs are particularly reliant on external connections. Accordingly, it is highly unlikely that the high-tech entrepreneur is entirely caught in the 'tyranny' of proximity, when searching for business opportunities.

External connections are further crucial to the continuing success of an industrial district. A homogeneous region totally dominated by regional connections may result in processes such as 'groupthink' that precludes competing perceptions and interpretations of information (Grabher 1993). Close ties between local industry, universities, research institutions and firms may further be distorted into collaboration against economic innovation. Without complimentary external connections the regional ties may be turned from "ties that bind to ties that blind", in Grabher's words (1993 p. 24). An industrial districts will benefit from inputs from both national and transnational ties that enable improvements and innovations other than those along the districts technological trajectory. Thus, while too little regional embeddedness may prevent cooperation on innovation, crucial to contemporary high-tech industries, too much local embeddedness may prevent newer radical innovations (Grabher 1993). As a result, the scarce resource in a knowledge intensive industrial district lies not only in the ability to develop strong regional ties but also in the competence of establishing complex business and professional relations across cultural and linguistic boundaries (Saxenian 1999).

The network form of organization, based on a densely knit regional network complemented by external connections has been particularly prevalent in technology intensive industries (Powell 1990). This development is not surprising considering, as already mentioned, how global competition has resulted in rapid changing technology and volatile markets. The uncertainties of the industries draw firms to collaborate to reduce risks and overcome weaknesses. If technology intensive industries tend to produce a certain organizational structure, it is of interest to look into whether different

technologies initiate equivalent organizational structures. This is particularly intriguing to investigate in the case of the Boston high-tech sector, which recently has experienced a technological diversification. If technologies such as electrical equipments, architecture, engineering, telephone communications, hardware and IT/software bring about slightly diverging organizational structures, actors may choose to adopt their connections to the unique organizational structure of their technological specialization. Accordingly, a question regarding the impact of technology arises from the discussion on the organizational structure.

### **The Entrepreneur's Ties**

While earlier studies have tried to map the entire network of a closed set of actors (Johannisson 1994, Nakano 2002), my ambitions are rather to focus on the ties of a few individual entrepreneurs. In this section, I borrow concepts from inter-organizational network theory and social network theory to integrate the different business, institutional and social aspects of the entrepreneurs' immediate ties.

Inter-organizational network theory, employed to describe the organizational structure of Boston's high-tech sector, has typically been used to explain the interactions between firms in industrial districts (Powell 1990, Pyke & Sengenberger 1990, Saxenian 1991 & 1994 O'Donnell et al 2001). In these districts, ties occur because firms perceive other firms to simultaneously embrace the roles of competitors and allies. In third Italy, Brusco (quoted in Brown & Butler 1993) found that firms cooperated with some firms at specific stages, while competing fiercely in other stages. Aldrich and Dubini (1991) argues that the inter-organizational network increases in importance, once the firm has become established and familiar with different actors in the immediate and external context. In this study, I want to treat the inter-organizational ties and the inter-personal ties of the individual entrepreneur as one. The inter-personal ties consist of people with whom the entrepreneur has direct relations to, but are not specifically other entrepreneurs, institutions or regional organizations. They may consist of family friends, former colleagues, and university mates or in other words, what the literature has called 'the old-boy' network (Leonard & Barton 1983, Rosengrant & Lampe 1992) According to Leonard and Barton (1983) these ties have long been used for business purposes in the

US. Inter-personal contacts are typically ties that the entrepreneur met on a face-to-face basis and provides support, advice and information to the entrepreneur (Johannisson 1994, Aldrich & Dubini 1991) These type of ties are primarily perceived to be crucial in the early phases of the firm, but may also serve as a continual support and source of information about improving operational efficiency and identifying new business opportunities (Brown & Butler 1993). In accordance with Johannisson (1994), I argue that inter-organizational and inter-personal ties do not need to be separated, when firms involved are generally small. Accordingly, the entrepreneur is capable of integrating the various social, business and institutional dimensions of the ties.

The literature reveals that different aspects of the ties are positively related to the performance of the entrepreneur's firm (Burt 1992, Aldrich and Zimmer 1986, Larson and Starr 1993). Furthermore, the scope of resources available to the entrepreneur through his contacts, are also dependent upon the kind of people with who the entrepreneur interacts. Therefore, I will discuss the optimum nature and characteristics of the entrepreneurs' different relations. More specifically, I will solely focus on ties that "in some way contribute something to the entrepreneur and his firm, either passively, reactively or proactively" (Gilmore & Carson 1999 p. 31).

The first aspect of a tie concerns what flows through it, or what I call *content*. Earlier studies have used various kinds of conceptions to categorize the content of a relationship. For example, Johhanisson (1994) operates with the terms friendship-, commercial- and professional ties while Bryson et al. (1993) uses the classifications supply, demand and support connections. However, none of these categories are ideal for the focus of this study. In a high-tech context, I would instead suggest the following types of content: *information, innovation, physical or materialistic resources and support*. Information is of great importance for the high-tech entrepreneur and may entail news about markets, employees and technology. These kinds of ties may involve an array of actors, varying from family and personal friends to other entrepreneurs, universities and regional organizations. Innovation flows is another broad category of contacts, referring to all the ties that somehow contribute to the innovative processes of the firm. In an era when innovation has become a collaborative endeavor, innovative ties may include universities, labs, research institutions as well as other entrepreneurs and firms. On the

other hand, relations that transfer materialistic resources are generally more limited. They refer to links that supply the entrepreneur with important components as well as ties to actors that contribute financially to the entrepreneurs firm. Support ties may typically involve close friends, family and former colleagues that may offer advice and encouragement. A fifth and ideal category, is when two or more of the mentioned contents, simultaneously flow through the tie. I will call this a *multiplex* tie. In industrial districts with a relatively dense network, such as the Boston high-tech sector, multiplex ties are especially common (Johannisson 1994). One might for example find overlaps of innovation and support flows. Since the strength of a relationship is partly dependant on its multiplexity it may be of particular importance for the high-tech entrepreneur to be in possession of such ties.

The second aspect of a tie concerns the *strength* of the relation. The literature has additionally used the terms 'intensity', and 'quality of a relationship' to describe tie-strength (Hall et al 1977, Zhao & Aram 1995). Tie-strength may not only be a function of the frequency of exchanges, but also a measure of the amount of resources that flows through it. According to Aldrich (1989), the benefits of a strong tie based on trust and reciprocity will far outweigh a weaker one, when the information or resources exchanged are manifold and complex. Furthermore, strong ties have greater motivation to be of assistance and are typically more easily available. Uzzi (1996) found that firms with strong ties to other actors in a set environment had better chances of survival than those with weak or lacking relations. However, this was only true to a certain threshold. After having passed the threshold, negative effects on the competitiveness of the firm, were associated with tie strength. A plausible explanation might be the exhaustive cost of maintaining extensive, deep ties. Moreover, a lack of weak relations may seal the entrepreneur off from novel and external information. From a knowledge entrepreneur's point of view, supplementing, weak connections may be critical to function effectively in a globalized world. Apart from nuancing the argument of strong ties, Uzzi's study also revealed that strong relations, in contrast to weak, have three significant features. The first feature entails the amount of trust liable to strong ties. Uzzi's interviewees not only described their strong ties as being part of the company, but also claimed that they had an interest in what their partners where doing, even outside of business. An actor in a strong

tie was convinced that the partner would not take advantage of him. The second feature involved the transfer of fine-grained information. Uzzi's interviewees would pass on critical information relating to new business opportunities to their strong ties and thus give them an advantage in relation to their competitors. The final feature of a strong relationship is joint problem solving. Uzzi's informants worked through problems with their strong partners instead of exiting, and thereby enriched their strong contacts with new solutions to the 'bottlenecks' they encountered.

In an industrial district, the paramount organizational feature is the existence of strong connections between firms (Sengenberger & Pyke 1992). With strong ties, an entrepreneur will not stand alone but rather depend on the whole network of firms to acquire resources. Strong ties will further protect the entrepreneur from the volatility that specifically characterizes high-tech industries. However, as mentioned in a previous section, firms in an industrial district do not only cooperate but do also compete. Accordingly, it is the combination of strong and weaker linkages between actors that keep the industrial community intact. These are factors knowledge intensive entrepreneurs from industrial districts have to take into consideration when developing connections.

The third aspect of a tie concerns its *durability* and is a measure of the time a relation has lasted. Empirical findings have demonstrated that entrepreneurs tend to hold on to their ties as they age (Aldrich & Staber 1995). The high-tech entrepreneur profits from longlasting ties in the sense that trust and reciprocity tend to grow with time. In other words, durability is indirectly related to tie strength.

*Centrality* is a fourth significant feature of ties and refers to *whom* or to *which organisations* entrepreneurs develop their ties to (Debresson & Amesse 1991). As a result of the asymmetries of most networks, specific actors benefit more than others do from their relationships. A central actor in a network is an individual or organization "who is tied to many others in the system, and the extent to which these others are in turn tied to many others themselves" (Powell & Smith-Doerr 1994 p. 378). Such an actor will possess an optimal position in regards to obtaining information on i.e. new technologies, prospective employees, 'best practice' innovation, venture capital and new customers. In fact, earlier studies have demonstrated that it is not an entrepreneur's total individual assets that is

important, but rather the resources that the actor can mobilize through his social ties (Powell & Smith-Doerr 1994).

It is of particular importance to be connected to central actors in knowledge intensive industries where technology changes rapidly and the life cycles of products are relatively short. Yet, mapping all the ties in the Boston high-tech sector in order to single out the well-connected actors goes far beyond the scope of this study. However, the tightly knit community of high-tech actors in the Boston region makes it plausible to employ *the integration into the white, elitist high-tech network* as an approximation for centrality.

I have labeled the fifth significant feature of an entrepreneur's connections: *complementary*. The vocabulary is chosen to demonstrate the perfecting role of external orientation in one's immediate connections, while simultaneously cementing the role of locality. In other words, complementarity refers to the supplementing function of external, (i.e. national and transnational) ties. Complementary connections transcend an entrepreneur's own narrowly circumscribed group and enables the entrepreneur to grasp opportunities from sources beyond the local (Grabher 1993). They further prevent the local entrepreneur to be locked into a homogeneous regional culture, where actors have ceased to challenge the underlying assumptions of the industrial district. As recently as the 1970s, only large firms had the opportunity to develop external capabilities. However, as a result of new transportation and communication technologies, any entrepreneur may build ties to foreign firms to tap overseas expertise, cost-savings and markets (Saxenian 1999).

*Diversity* is the last aspect of entrepreneurs' ties and is uniquely relevant to informative ties. It refers to connections of the entrepreneur who are not known by each other (Aldrich & Dubini 1991). Since the strong ties of an entrepreneur are more likely to know each other, information known to one person is rapidly diffused to the others. Thereby, the entrepreneur will get no new information from talking to one strong contact beyond what she already knows from interacting with another. On the other hand, the entrepreneur's weak ties are less likely to know each other and may therefore contribute with new information deriving from their specific ties. According to Granovetter (1973 & 1982), individuals with few weak ties will be disadvantaged due to the lack of

information from diverse parts of the social system. However, it is questionable how significant weak and diverse ties are to high-tech entrepreneurs. In order to transfer sensitive and complex information in their daily operations, entrepreneurs need to resolve problems of trust and reliability. Weak and diverse ties are not very likely to carry such attributes. Yet, Uzzi's study demonstrated that the drawback of having only strong ties is that it may seal the entrepreneur off from new opportunities. Thus, a high-tech entrepreneur may benefit from balancing weak and diverse informative ties with a set of stronger ties.

These optimum characteristics of an entrepreneurs ties makes it interesting to investigate what kind of ties ethnic entrepreneurs in knowledge intensive industries employ. Are the optimum characteristics reflected in the Indian entrepreneurs' total set of connections?

### **The Development of Connections and Prospective Barriers**

In the initial steps of launching a new firm, the entrepreneur's role-set, namely his complete set of connections are typically irrelevant and imperfect to carry out the daily operations of the firm. In order to develop an appropriate set of ties, and integrate into the overall network, the entrepreneur must engage in a time consuming search and selecting process (Aldrich & Dubini 1991, Larson & Starr 1991). More specifically, the need to acquire resources, stay abreast on new technology and find appropriate collaborative partners drives the entrepreneur to both take advantage of established relations and develop new ties to relevant actors in, and beyond, the local context. As mentioned above, the development of ties are facilitated if the actors share some kind of common background (Granovetter 1985, Powell 1990, Larson & Starr 1993 & Waldinger 1995). Furthermore, the entrepreneur's past relations play a crucial role. Accordingly, entrepreneurs may turn to their previous colleagues, university mates, friends and family to assist them in developing their role-set. Uzzi (1996) found that personal relations were fundamental in expanding the entrepreneur's ties, by acting as the third party referral or simply extending a friendship to a business relation. In the first situation, an already established contact would act as the go-between to a new contact and thereby transfer the trust from the existing relationship to the newly established one. The third party would

further use the reciprocity owed to him by his contact and transfer it to the newly matched pair of actors. In the second situation, a previous tie would be engaged in new collaborations, elaborating the multiplexity of the relationship.

Larson and Starr (1993) have suggested that the process where actors expand and strengthen their relationships may be divided into three stages. Applying their model to entrepreneurs in the Boston high-tech network would imply that actors in the very first stage, would turn to their prior colleagues, friends and family in order to facilitate the expansion of their role-set. We would further expect them to draw on their regional affiliation, their class and their ethnicity in order to establish trust with their new ties. When entering the second stage, the entrepreneur would be equipped with a broad range of contacts consisting of the prior relations and the newly established ties. The new ties would still be relatively weak, due to the lack of repeated interactions, their single dimension and their limited durability. However, the flow of complex information, innovation and physical resources requires strong and multiplex ties. This dilemma would gradually be overcome in the second stage, when exchanges and evaluations are accumulated and explicit and implicit rules begin to take shape. Furthermore, the relations would increasingly become more complex, interweaving social and economic dimensions (Larson & Starr 1993). Not until the third stage, however, would the relations be characterized by the required trust, reciprocity, mutual goals and interdependence that it takes to transfer the fine-grained technological information, or embark in collaborative innovation. In this last stage, certain key ties would be prioritized over others, resulting in blurred firm boundaries and tightly integrated actors. Finally, the matured role-set would function as a platform for establishing new ties, equipping the entrepreneur with the appropriate 'tools' for integrating into the Boston high-tech network.

This theoretical 'thumbnail' sketch of the development of ties and integration into the Boston high-tech sector is obviously a simplified and idealized account of the process. Moreover, it does not take into consideration the various barriers that an entrepreneur would encounter. As I intend to demonstrate, the barriers are in fact related to the same mechanisms that ease and enhance exchanges between actors in the high-tech sector. We recall that a shared background and prior interactions with a person, facilitate the development of a strong relation in economic life. Granovetter specifically points this



out in his commonly cited article on *Economic Action and Social Structure* (1985 p. 491), by stating that individuals are concerned with the "identity and past relations of individual transactors". He further notes that, to some extent, this is a "function of whether they or their own contacts have had satisfactory past dealings with the other". By drawing attention to the importance of identity and past interactions, Granovetter aims to argue that "social relations (...) are mainly responsible for the production of trust in economic life" (1985 p. 491). According to Zucker (1986), identity refers to an attribute or a certain background that is ascribed to an individual. Trust is therefore a result of characteristics such as family background occupational history and ethnicity. Actors relying on identity primarily seek out information concerning social similarity. Socially similar persons generally share the same worldview and have a mutual understanding of how exchanges should be carried out. The more background attributes that are held in common, the easier and more satisfactory is the transaction (Zucker 1986). Thus, interpersonal similarity increases ease of communication, improves predictability of behavior, and fosters relationships of trust and reciprocity. As I have discussed above, exchanges in the Boston high-tech network are largely smoothed by interpersonal similarities. The actors in the sector have traditionally been rather homogeneous, not only sharing the same regional affiliation but also common attributes, such as class and ethnicity. Part of a conversation from Nohria's (1992 p. 248) case-study on high-tech entrepreneurs seeking out partners to provide them with financial capital, may function as an illustration of the importance of identity in the Boston high-tech context;

A: "I've been involved in this venture for the last two years

B: And what were you doing before that?

A: Well, I graduated from MIT, worked with Raytheon for a while, then went on the GTE Labs. During that time, I was basically working on defense contracts. Then about five years ago, I joined a friend of mine in this instrumentation venture, but that was soon acquired and that's when I decided to start my own venture.

B: Which part of Raytheon did you work in? I used to know some folks who were also involved in defense contracts there".

The conversation continues and the actors cross-examine one another until they have discovered that they not only share the same regional affiliation but also a common social position upon which a relation of trust may be built. What is further interesting with this

conversation is that the actors establish a common link via a person they are both connected with. Accordingly, they have based their newly developed relation on both identity and past relations. Granovetter specifically emphasized that actors prefer to interact with members of their own role-set. It is due to the fact that "one trusts one's own information best- it is richer, more detailed, and known to be accurate" (Granovetter 1985 p. 490). Yet, the same factors that resolve the problems of trust and reliability among actors may also have the effect of restricting outsiders (Waldinger 1995). If established high-tech entrepreneurs prefer interacting with well-known partners and passing on and retrieving information from their 'old-boy network', what about newcomers who lack 'track records'? The extreme volatility of the high-tech sector and the complexity of interactions will make established entrepreneurs hesitant to form ties and collaborate with newcomers. Furthermore, since repeated interactions are associated with trust and reciprocity, the opposite, namely the lack of prior relations will be linked to malfeasance. Hence, an entrepreneur who tries to enter the high-tech field will, on the one hand, have to overcome barriers associated with being a 'neophyte' (Waldingers 1995). On the other hand, some of the newcomers will also be confronted with barriers stemming from the fact that they are not perceived to be "members of the club" (Waldinger 1995 p. 559). The trust deriving from a shared worldview based on regional affiliation, class background and ethnicity does not apply to outsiders who possess contrasting characteristics. Furthermore, if transactions with insiders generate standards of behavior that discourages opportunism, interactions with outsiders who lack significant attributes, will be associated with predatory behavior. Therefore, established actors will be even more hesitant to develop ties to neophytes who also possess a different identity that further push beyond the high-tech community.

The Indian entrepreneurs that are the focus of this particular study may not only encounter barriers associated with being neophytes, but also impediments relating to the lack of 'correct' individual traits. We know from the discussion in chapter two that a large majority of Indians are foreign born and recent immigrants. Thus, we may expect Indian entrepreneurs to possess characteristics that contrast with the established actors in the high-tech sector of the Boston metropolitan area. Chapter two further illuminated that the passage of the 1965 Immigration Act, triggered an increased inflow of immigrants

from India, as well as from other Asian countries. These were, to a large extent, highly educated professionals with extensive working experiences. Furthermore, the Asian science and engineering workforce in America is comprised of a disproportionate number of students-turned-immigrants (Tang 1995). Thus, it is plausible that Indian entrepreneurs in the Boston high-tech sector are educated in the region and possess social positions similar to the white high-tech entrepreneurs. If this is the case, the barriers of class and regional affiliation will not be as grave and excluding as the ethnic boundary. For example, Barth (1969 p. 17) has suggested that ethnicity is "super ordinate" to most other statuses. This super ordinate character may imply that ethnicity cannot easily be disregarded or temporarily set aside.

Deriving from the set of arguments outlined above, is the notion that the different entry barriers are *unintended* consequences of the nature of economic action, or what Waldinger (1995) has aptly phrased "the other side of embeddedness". The same network or individual role-set that makes it possible for the established entrepreneur to exchange complex information and immerse into collaborative innovation, also has the drawback of excluding newcomers, especially those lacking the 'correct' identity. While agreeing with Waldinger's argument, I would further like to assert that the unintended exclusionary mechanisms relating to ethnicity might be reinforced by specific social processes and thereby supplemented by *intended* exclusionary pressures. This may occur when barriers to ethnic group contact begin to break down (Olzak 1992), as in the case of the Boston high-tech sector. As demonstrated in chapter three, white males have traditionally dominated the Boston high-tech sector. Only recently, and in growing numbers, have Asian entrepreneurs entered the field (Roberts 1991, Tang 1995). Furthermore, we know from earlier entrepreneurship studies that immigrants and minorities in general, tend to concentrate in certain sectoral niches or ethnic enclaves (Light & Gold 2000, Aldrich & Waldinger 1990, Lee 1999). Due to the limitation of these markets, as well as increases in immigrants and minorities' educational levels, financial capital and political power, entrepreneurship must invariably spill over into the mainstream economy. When minorities enter a field that traditionally has been controlled by another ethnic group, such as the white mainstream, the dominant group will view the advancing group as a threat to their position (Olzak 1992). In other words, the entrance of Indian minorities

into the high-tech field may generate a motivation by the established white entrepreneurs to exclude Indian entrepreneurs from the high-tech network, thereby adding intended exclusionary mechanisms to the unintended. I thereby suggest that the unique barriers minority entrepreneurs might face must be regarded as a consequence of the embeddedness of economic action, as well as a result of the well-documented (Skeeter 1985, Bates 2001, Rapports from CURP 2001 & GBCC 2001) discriminatory process. A question that considers the openness of the Boston high-tech sector arise as a result of the unintended and the intended consequences of economic action. In a previous section, I demonstrated the importance of being part of a network for a high-tech entrepreneur. The particular power structure of the Boston high-tech sector makes it interesting to investigate whether the Indian entrepreneurs have managed to integrate into the established high-tech network of the mainstream.

### **Ethnic Strategies?**

While white entrepreneurs face familiar terrain when entering the high-tech sector, ethnic minorities may be confronted with skepticism. The mechanism of network closure that excludes minorities from crucial resources in the field may force them to adopt certain tie-strategies in order to stay competitive. Comprehensive empirical evidence have demonstrated that the reliance on proximate co-ethnic ties has been the prevailing strategy to pursue (Aldrich & Waldinger 1990, Portes 1995, Waldinger 1995, Zhou, 1998, Light & Gold 2000). However, evidence in favour of ethnic tie strategies has not derived from ethnic entrepreneurs in knowledge intensive industries. In contrast, studies have focused on low-skilled sectors where ethnic minorities have limited knowledge about the new context and need to obtain reliable information on permits, laws and business sites (Waldinger et al 1990). In such cases, minorities not only tend to turn to their already established co-ethnic connections to retrieve crucial information, but they also typically take advantage of ethnic family and friends in order to secure cheap or unpaid labor. Ethnic ties may provide them with information on trustworthy co-ethnic suppliers who are flexible on credit and may carry out transactions in their common native language (Aldrich & Waldinger 1990). Another frequently mentioned benefit of co-ethnic contacts has been the rotating credit associations (Light & Gold 2000).

Members of these associations agree to rotate their periodic contribution around the group until all has received the whole sum of money. Light and Bonacich (1988) have demonstrated that Korean credit associations in Los Angeles provide members with large sums of money, sufficient to start up a restaurant or purchase a gasoline station. A co-ethnic role-set may also be valuable as a source of capital, beyond the rotating credit association. An often cited example are extensive loans between kinsmen that are sealed through verbal agreements and rarely involves any interest (Waldinger et al. 1990) Ethnic entrepreneurs further tend to devote a lot of time and effort to nurturing and developing their co-ethnic role-set by taking advantage of ethnic ritualized occasions and ethnic media (Aldrich & Waldinger 1990).

Notwithstanding the benefit of ethnic tie strategies in low skilled sectors, it is questionable how rewarding a local ethnic role-set may be in a knowledge intensive industry like the Boston high-tech sector. For example, Light and Gold (2000 p. 104) have suggested that ethnic ties are "more important in the entrepreneurship of impoverished groups than in the entrepreneurship of the affluent". Moreover, Ram (1999), has noted that the demand for highly skilled and credentialized workers in professional sectors, leave little scope for recruiting through one's co-ethnic role-set. Thus, the complexity of a high-tech firm makes it highly unlikely that an entrepreneur solely can rely on a local co-ethnic role-set to stay competitive. In the case of Boston's high-tech sector, are Indian entrepreneurs able to stay abreast on new technology only through interactions with other co-ethnics in the field? Can they retrieve crucial information such as news on 'best practice', new market opportunities and prospective employees, from their ethnic organizations and institutions? Is the local ethnic role-set sufficient to equip an Indian entrepreneur with appropriate suppliers? Finally, the under representation of Indians in the high-tech sector, might make it severely difficult for ethnic entrepreneurs to locate other co-ethnics. Therefore, I anticipate Indian entrepreneurs in the Boston high-tech sector to prioritize other social ties in order to stay competitive. I also perceive the specific characteristics of the high-tech sector to attenuate the importance of local ethnic relations. In other words, I expect my study to diverge from earlier studies that have confirmed ethnic entrepreneurs comprehensive reliance on the ethnic tie-strategy. Furthermore, the optimum nature and characteristic of a role-set,

positively related to the performance of an entrepreneur's firm, conflicts with a role-set over represented by regional co-ethnic ties. For example, insufficient diversity and a lack of external orientation in one's role-set may prevent an ethnic entrepreneur who pursues an ethnic tie strategy from succeeding. Moreover, failing to integrate into the mainstream high-tech network may result in the entrepreneur missing out on crucial resources in the regional environment.

A recent study by Saxenian et al (2002) sets forth evidence of an alternative tie-strategy ethnic entrepreneurs may pursue. Saxenian demonstrates how Indian and Chinese entrepreneurs from Silicon valley extensively make use of their *transnational ties* to local high-tech sectors in India, China and Taiwan. This is also in accordance with social theory that stresses the importance of complementary external ties that assists the entrepreneur in grasping opportunities from sources beyond the local. Transnational ties further have the potential to spur innovations other than those along the districts technological trajectory. Immigrants typically have a deep understanding of the area they come from and apprehend the kind of attitude and behavioral pattern present. Moreover, they are at least bilingual and can move easily between the US and their country of origin (Portes 1996). The ethnic entrepreneurs of Silicon Valley not only frequently travel home to meet with business contacts, but also profit from low-cost skills and markets in Asia. Significantly, Indians are in a privileged position to take advantage of software programmers and systems analysts in India, where wages are ten times lower than in the US (Saxenian et al 2002). The comprehensive availability of skills in the five urban high-tech areas of Bangalore, Bombay, Chennai, Hyderabad and Pune in India, is an essential prerequisite for Indian high-tech entrepreneurs to rely on such external ties. The time difference further makes it possible for ethnic firms, with employees in both India and the US, to work around the clock (Saxenian et al 2002). Thus, the under representation of Indians in the high-tech sector of Boston may encourage Indian entrepreneurs to rely on external connections to local high-tech sectors in India. Furthermore, the anticipated process of marginalization may force Indian minorities to use external ties as a substitute for integration into the Boston high-tech network.

Alternatively, it is plausible that Indian entrepreneurs have succeeded in breaking down ethnic barriers and are managing to stay competitive by balancing local white and

cross-race connections. Ibarra (1993 & 1995), for example, has pointed out that well-educated successful minorities adopt tie strategies of assimilation or racial heterogeneity in order to reach their goals.

## **Summary**

The goal of this chapter has been to construct a framework to guide my analysis. Therefore, I have presented an ideal type picture of the research setting by theoretically discussing the context, the actors, different aspects of the actors' relations and their plausible patterns of action. I have further discussed and elaborated on crucial relationships and processes in the research setting that will clarify the empirical analysis. Moreover, I have grounded my research questions in social theory. I commenced by defining an ethnic entrepreneur as an individual with a certain ethnic group attachment who launches a firm based on incremental or revolutionizing innovation. I then elaborated on the organizational structure of the Boston high-tech sector where the entrepreneurs have set up their firms. I not only argued that the sector had transformed from a hierarchical organization to a network form of organization but also elucidated why connections have become crucial for the individual entrepreneur. Moreover, the intrinsic web of regional actors in the Boston high-tech sector very much resembles the structure of an industrial district. However, in order to fully understand the sector one must also consider external connections, such as national and transnational ties.

I then moved on to a detailed description of the ideal type nature and characteristics of connections on the individual level, highlighting features such as tie-strength, durability, multiplexity, complementarity and diversity. After demonstrating that the development of ties is a gradual and time-consuming process I specified that the exchanges that are carried out through an entrepreneur's ties are smoothed by interpersonal similarities and past interactions. However, a new Indian entrepreneur who sets up his firm is not only likely to be perceived as a neophyte, but he also lacks the 'correct' identity, namely that of being the white mainstream. Accordingly Indian entrepreneurs may encounter strong barriers when developing their role-set and integrating into the local high-tech community. In addition, exclusivity pressures may arise as a consequence of ethnic group competition. After elucidating these relationships,

I am now in a position to empirically analyse the type of connections that Indian entrepreneurs in Boston's high-tech sector have formed and are making use of.





## **Chapter 5**

### **Research Design and Methodology**

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This chapter precedes the analysis and makes explicit the research design and the methodology at use when carrying out the research. The aim of the chapter is specifically to discuss the knowledge claims, the strategies of inquiry and the methods of data collection and analysis in this study. It will further address issues concerning the researchers identity and background, and draw conclusions on how the researchers positioning may have influenced the findings. Finally, the concerns of validity and the trustworthiness of the findings will be laid out.

#### **The Selection of the Study Site and the Participants**

The idea behind qualitative research is to purposefully select participants or sites. As a result, the Boston high-tech sector was deliberately chosen as an arena presenting a special opportunity for the elaboration of ethnic entrepreneur theory. The development of theory within the ethnic entrepreneur field has primarily been based on evidence deriving from immigrants and minorities in low-skilled sectors. Thus, the knowledge intensive nature of the Boston high-tech sector not only made this arena an intriguing and unusual setting to explore but also carried the potential of taking one step towards a more nuanced ethnic entrepreneur theory. Furthermore, the Boston region has not traditionally been a major destination for minorities in the US. In contrast to metropolitan areas such as Los Angeles, New York, Washinton DC and Houston that for close to a century have contained large minority populations, Boston have only recently experienced an influx of non-European minorities. As a result, scholars within the ethnic entrepreneur field have yet to discover the potential of the Boston metropolitan area as a relevant research site. Furthermore, the Boston high-tech sector was selected above prospective knowledge intensive settings in my native country, due to the actual presence of ethnic entrepreneurs in the Boston high-tech sector.

The most important factor when selecting the participants for this study was to focus on a neglected, yet important ethnic group within the ethnic entrepreneur field.

According to Leonard and Tibrewal (1993 p. 143) "there is virtually nothing available on Asian Indian entrepreneurs". The Asian Indian ethnic group may be perceived as a social construction based on one or more of the following criteria: (a) characteristics presumed to be based upon shared genealogy, (b) cultural traits, including language, religion, dress, custom, or assumed shared history, and (c) nationality or regional origin. Based on the discussion in my previous chapters, I emphasized three additional factors when selecting participants. First, I defined an entrepreneur as an individual who launches a new venture, based on minimal or revolutionizing innovation. Secondly, I described an ethnic entrepreneur as an entrepreneur with an ethnic group attachment, by virtue of either self-definition or ascription. Finally, the Indian entrepreneurs' firms had to be registered with one of the high-tech NAICS codes. The specific NAICS codes corresponding to high-tech industries are all characterized by a high degree of technological sophistication, large R&D expenditures and capacities, a high patent and innovation intensity, and industries that have a substantial technological impact on other economic sectors. In this study, I have followed DeVol's (1999) selection of NAICS codes<sup>12</sup>.

The selection of the participants was a gradual process where I first singled out Indian CEO:s based on their name, from databases operated by the State Office of Minority and Women Business Assistance. Moreover, I ensured that all firms were registered with one of the high-tech NAICS codes. By searching the World Wide Web, I was able to cement their ethnic group attachment. I collected evidence on their education, their firm, their involvement with the Indian community and other volunteer activities. Naturally, I had to exclude a few entrepreneurs that turned out to be Pakistani and Bangladeshi instead of Asian Indian. I further searched databases containing information on a majority of all the registered firms in the US and gathered evidence from the 'homepages' of the entrepreneurs' firms. As a result, I was able to determine whether any incremental or radical innovation had taken place within the firm. At the end of this process I had acquired a list of 20 Indian entrepreneurs in the Boston metropolitan area that fulfilled my requirements. To ensure that my selection was correct, I included questions in my questionnaire that would confirm or disconfirm their

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<sup>12</sup> DeVol used the older SIC system. As a result, I had to translate the SIC codes to NAICS codes by using the US Census converting tables that may be found on [www.uscensus.gov](http://www.uscensus.gov).

identity and the innovative characteristic of their firm. Thus, when selecting participants to this study, I made use of the method of triangulation, recommended by Yin (1989) and Ragin (1994).

### **The Collection of Data**

Data on the Indian entrepreneurs were collected during May, June and July 2004. To ensure higher validity the data were gathered and triangulated from four different sources. They are 1) Public sources: company reports, entrepreneurs' resumes and advertising materials 2) Questionnaires: a combination of open ended and closed-ended questions 3) Interviews: semi-structured face-to-face or telephone interviews 4) Complete observation: observing without participating. In addition to using multiple datasources, two types of information were sought in order to check my understanding of the strategies that Indian entrepreneurs adopt. I gathered 1) attribute data: attitudes, opinions, and behavior of agents, and 2) relational data: contact, ties, or connections between individuals.

The public sources helped me to gain insight on the technological sophistication of the entrepreneurs' firms. Moreover, the documents provided an introduction to the entrepreneurs spatial network strategy. For example, a public document presented information on an entrepreneurs' national and global partners. Public documents, such as entrepreneurs' resumes posted on their firms' homepages, were further useful when determining the entrepreneurs' background, socio-economic status and regional anchoring.

A questionnaire with a combination of open-ended and closed-ended questions was constructed in order to retrieve data on the nature and characteristics of the connections the entrepreneurs made use of, in the daily operations of their firm. The questions were generally straightforward and easy to comprehend<sup>13</sup> and thus appropriate for a questionnaire. The responses on the questionnaire were later followed up and elaborated on during the interview. Such a two-folded strategy was selected in order to occupy less of the entrepreneurs' time. The entrepreneurs represented a local minority

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<sup>13</sup> See Appendix 1

elite, who by definition are less accessible and more conscious of their own importance and time (Richards 1996).

During the semistructured interviews with the entrepreneurs, I used a protocol to remind myself of the themes that I wanted to discuss. These were themes that followed up on the entrepreneurs' responses to the questionnaire. Furthermore, I constructed 12 elaborative questions relating to past events, attitudes and opinions of the entrepreneurs that may not be explored through a questionnaire (Creswell 2003). During the dialogue, the entrepreneurs were able to explain the complexities of their experiences and describe their understanding of relevant issues. My initial goal was to conduct all my interviews in a face-to-face situation. However, due to the ethnic entrepreneurs' hectic schedule and their general lack of time, I had to carry out some of them by telephone. Besides interviewing Indian entrepreneurs, I also talked to other relevant high-tech actors in the Boston region, such as executive directors of business forums and high-tech employees.

Finally, complete observation was carried out during the visits I made to some entrepreneurs' offices when scheduling a meeting or interviewing a subject. These visits provided me with information on the spatial integration of the firms. Moreover, by observing the actors who turned up to discuss a prospective business opportunity or passed by to chat, I was able to develop a basic understanding of the entrepreneurs' degree of social integration into the white, elite network. Furthermore, I also observed the entrepreneurs' actions during events at local business forums where high-tech actors gathered to seek new information and expand their current role-set. Yet as a whole, complete observation was of limited importance to the analysis of this study.

### **Data Analysis Strategies**

Qualitative case studies, such as my own, seek to construct representations based on in-depth detailed knowledge of *cases*, to correct misrepresentations or to offer new representations of the research subject. Moreover, the study of cases is particularly suitable when *exploring* a social phenomenon (Yin 1989), such as the tie-strategies of ethnic entrepreneurs. When carrying out an explorative case study, it is of vital importance to develop a preliminary theory related to the phenomenon being studied. Yin (1989) has pointed out that "the role of theory-building, prior to the conduct of any data

collection, has been overlooked in the traditional way of doing case-studies”. Thus, when commencing this study, my first priority was to develop a rich framework in order to cement the study’s relevance to ethnic entrepreneur theory. More importantly, my frame was set fourth as a guide for my research, demonstrating which kind of factors might be relevant to explore. Despite the fact that it was unclear what kind of strategies atypical ethnic entrepreneurs in an atypical sector, in an atypical metropolis would adopt, I put fourth suggestive hypothesis regarding the social phenomenon. However, I was aware of that contrasting empirical evidence must result in a revision of the hypothesis.

After reviewing the ethnic entrepreneur literature and considering the insights from interorganizational and social network theory I analyzed the data collected from an initial case in the light of my theoretical framework. While keeping in mind my ideal frame, I proceeded to analyze the data from a second, third and fourth case and continued the process until all my interviews were accomplished. I thus used a multiple-case design in order to increase the robustness of the study. When analyzing an Indian entrepreneur’s role-set I specifically took into account the type of technology at use in the daily operations of his firm. Additionally, I considered the influence of the entrepreneurs’ backgrounds and experiences. Accordingly, my data analysis strategy involved a pattern matching and a comparative logic. The very last phase of my qualitative study was to draw conclusions by linking the results to social theory. The pattern matching methodology used may be illustrated by the following figure inspired by Yin (1989).

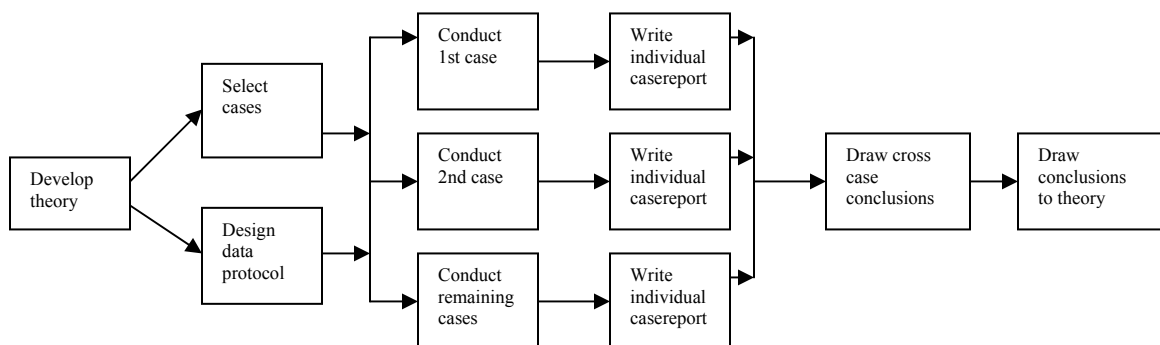


Figure 5. Multiple case study methodology. Source: Inspired by Yin 1989

## Positioning

According to Flowerdew and Martin (1997), it is essential to reflect on your positionality when conducting qualitative research. Positionality refers to how the researcher's identity shapes the interactions with the participants of the study. A crucial aspect of positionality is the power relation that exists between the researcher and the interviewees. The assumption that the researcher usually is in a privileged position may be illustrated by a quote by Cindi Katz (1992 p. 496):

"The research relationship is a peculiar relationship- unequally initiated, situationally lop-sided, spatially dislocated, temporally isolated, extrinsic in purpose- it oozes with power".

However, the researcher in this study did not personify the dominant position when conducting fieldwork. In my interviews with the local, minority elite in the Boston high-tech sector, the entrepreneurs often had the upper hand by controlling access to information on their company and knowledge about their connections. I had the role of a supplicant, dependent on the co-operation of a relatively small number of entrepreneurs with the specialized characteristics I was searching for. Thus, it was not only challenging to get passed voice mails and executive assistants, but also to convince the entrepreneurs that it was worthwhile meeting with me. For example, one successful minority entrepreneur demonstrated his power symbolically by hanging up on me, once I had introduced myself as a graduate student conducting research. Moreover, when meeting the entrepreneurs in person I soon realized that in order to gain respect from these minority elites, I had to demonstrate professionalism and extensive knowledge of the field. The fact that I am a young woman did not make it easier. The stereotypes associated with gender and age made it severely difficult to convince some successful minority entrepreneurs that my research was worth their time.

However, as a consequence of my outsider position as a graduate student from Norway, I represented less of a threat to the ethnic entrepreneurs. For example, during the interview situation some entrepreneurs spoke openly about the barriers they had encountered when developing their network. I suspect that they had been more restrained if a white local student carried out the equivalent interview. Further supporting this point

is the fact that when the interviews took place in a public setting, such as a restaurant or a cafe, the interviewees would almost whisper when elaborating on the impediments they had faced when entering the Boston high-tech sector. Thus, I early developed an awareness of the sensitivity of the information I was asking for.

While carrying out my interviews, I further experienced that, it was easier to retrieve information from young, professional entrepreneurs than the more established. By drawing on mutual experiences, such as Indian culture, traveling, and graduate school, I was able to build relationships of trust to the young Asian Indian entrepreneurs. Even though the majority of the more established entrepreneurs expressed their generosity by participating in this study, a few Indian entrepreneurs were extremely conscious of their own importance and lack of time. They spoke with an articulated formality and were hesitant to convey any information not related to their professional position.

My dual position as a graduate student and an outsider to the high-tech sector was *initially* disempowering. Yet, *after* I had gained access to the ethnic entrepreneurs, my status, as a graduate student appeared to provide some degree of ‘insidership’ with the entrepreneurs. Most of the entrepreneurs had extensive experience from academia and were familiar with the methods of inquiry. Moreover, the entrepreneurs appeared to share a deep respect for academia’s search for knowledge. However, two entrepreneurs diverged from this pattern. They were intimidated by the fact that academic research tends to be published in some way. Both of these entrepreneurs refused to convey any information about their firm or their connections, even after I had explained that no information would be published on any individual basis.

### **Protection of Human Subjects from Harm**

According to Babbie (1992 p. 471) the definition of harm includes “emotional and psychological distress, as well as physical harm”. A number of steps were taken to address any potential for harming or causing discomfort to the participants of this study. First, the research design, procedures, questionnaire and interview topics were made available to the University of Oslo, through my supervisor, for review and approval. Secondly, I informed my participants of the procedure and the topics of the questions that I intended to ask. I further ensured that all the interviewees were aware of the fact that



there responses on the questionnaire or the interview would not be published on any individual basis. Finally, once I realized the sensitivity of questions relating to the barriers minorities are facing, I tried to select non-public or less-public spaces for the interviews, such as the offices of the entrepreneurs and the green areas surrounding them.

### **Validity**

The following steps were taken in order to increase the validity, or in other words the accuracy and credibility of the findings. I used multiple methods (text analyzing, questionnaires, interviews and complete observation) to try to maximize my understanding of my research questions as well as the trustworthiness of my conclusions. I also developed an awareness of the bias of the researcher by articulating my positioning early in the process. Since I had the opportunity to spend prolonged time in the field (January 2004-November 2004) I was able to develop a deeper understanding of the context and the actors of interest. Moreover, in order to secure that my questionnaire and my interview topics were firmly rooted in my research questions, my supervisor reviewed them. I also strived to operate with a language comprehensible and suitable to business elites. Finally, in the last stages of the research process I made use of peer debriefing to ensure that my analysis made sense to others than the researcher.

Despite the preventive measures undertaken to increase the validity of the study, uncontrollable factors may have biased the findings of my research. A few issues require attention. First, a few entrepreneurs expressed an exceptional awareness of social network theory. These entrepreneurs had often recently finished a master's degree or a PhD. Thus, it is plausible that their responses to my questionnaire and my interview are influenced by their knowledge of the field.

Another issue of validity concerns the selection of entrepreneurs. My initial intent was to strive for variation when singling out Asian entrepreneurs for my study. This was not an attempt to make the case representative to a larger population, but rather an effort to design a more compelling and illustrative case. Moreover, my aspiration was to include entrepreneurs from a range of different technologies in order to provide a comprehensive answer to research question "c". However, the fact that all public databases containing listings of Asian Indian entrepreneurs were biased in some way or

another, made it hard to pursue this ambition. For example, the State Office of Minority and Women Business Assistance's database from which I selected a majority of my participants, was set up to increase minorities' involvement in the public sector. Furthermore, only the entrepreneurs from IT/software functioned according to the network logic that I have outlined in chapter four. As a result, I was unable to convince more than one Indian entrepreneur from engineering industries, the industry where most Indian entrepreneurs are concentrated, to participate in my study. Additionally, a few entrepreneurs that I had selected for my study refused to talk to me, arguing that they were not successful enough. As a consequence of these unintended factors, it is likely that my case only includes a certain stratum of Indian entrepreneurs.

Finally, In order to explore the barriers the entrepreneurs had faced when entering the Boston high-tech sector, I had to ask them questions based on past activities. The trustworthiness of the subjects' memory is not complete and the answers may thus lack in detail. However, I tried to ask them several questions addressing the same issue to improve the accuracy and holism of their answers.

### **Trustworthiness of the Findings**

In order to facilitate that the operations of my study may be repeated with the same results, I have made my questionnaire and interview protocol public, by including them as an appendix in the end of this thesis. Since I was the sole interviewer, I also prevented the possibility of introducing incompatible interviewing styles.

It is believed that in-depth, qualitative studies, in general, generate more accurate and reliable depictions of participants than quantitative studies. This is due to the fact that the interviewer is able to draw on factors such as shared experience and identity to produce a rich detailed conversation based on empathy and mutual respect (Flowerdew & Martin 1997). In this study, I made use of our mutual experience from academia and various international settings to build a more reliable report.

Yet, when doing qualitative research the positioning of the researcher will always influence the conclusion of the study. Therefore, it is plausible that an older male researcher, for example, would have retrieved alternative information from the interviews, resulting in a different conclusion than mine. Furthermore, the limited amount

of time spent with each interviewee in conjunction with my lack of experience from high-tech environments may have prevented me from posing sufficient and precise questions.

### **Generalizability**

The conclusions of this study are derived from data gathered from nine cases of Indian entrepreneurs. Since this study methodologically represents a case-oriented approach, the conclusions are generalizable to theoretical propositions only, and not to populations or universes. The role of this study is thus to contribute to ethnic entrepreneur theory by linking the results to a broader framework. In other words, the research may only be subject to analytical generalization (Yin 1989).

## **Chapter 6**

### **Findings: The Connections at Use**

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In an effort to understand the social tie-strategies of ethnic entrepreneurs in a knowledge intensive sector, this chapter will present data from my fieldwork and analyze the connections that nine Indian entrepreneurs in the Boston high-tech sector have formed and are making use of in the daily operations of their firms. My approach is sequential and commences with a discussion on how the interviewees initially developed their connections. It is followed by an in depth analysis of the specific ties the Indian entrepreneurs make use of on a day-to-day basis to keep their firms at the competitive edge. Before I summarize the findings and return to the objective of this thesis, I investigate the impact of technology on my interviewees' role-sets. First a few words about the background of the nine Indian entrepreneurs and their respective firms.

#### **The Entrepreneurs and their Firms**

The nine Indian entrepreneurs interviewed in this case-study conformed almost perfectly to the general life and career path of Asian Indians in the region. Moreover, the interviewees had remarkably similar backgrounds in many aspects. For example, the entrepreneurs had immigrated to the US after the Immigration and Nationality Act of 1965 was passed. Seven of the entrepreneurs who mostly specialized in software related industries had immigrated as late as the 1980s or 1990s. The two other entrepreneurs, concentrated in engineering and architectural services, had immigrated immediately after the US removed the national quota system in 1965. Accordingly, the Indian entrepreneurs in this case study were all part of the so-called 'professional stream' of immigrants. Furthermore, it is worth noting that none of the entrepreneurs had been born in the US. Another characteristic that the interviewees held in common was their high levels of education. Aside one exception, the lowest professional degree obtained by the entrepreneurs was a master's degree. The identification with higher social classes was also evident among the nine Indian entrepreneurs. During the interviews, the Indian entrepreneurs demonstrated a consciousness of the notion that they were part of a

professional and affluent community. “In childhood, we (Indians) are taught to perform and achieve” explained one entrepreneur. They also seemed to be aware of their role as a ‘model’ minority in the US. The Indian entrepreneurs communicated class through the same status signs as the white American elite, namely expensive cars, clothes and traveling.

The standard career path of the interviewed entrepreneurs was to complete a bachelor’s degree in India and pursue a master’s degree or a PhD in the US. Thereafter, the Indian entrepreneurs would hold a job in the Boston region for an extended period before launching their own firm. As a result, all but one interviewee were student- turned immigrants. As of today, the entrepreneurs had become permanent residents, holding greencards, or citizens of the US. An additional shared trait among the entrepreneurs was their perfect knowledge of the English language. Their vocabulary was extensive and I could not perceive that they had any problems interacting in an English business environment. However, the two entrepreneurs that immigrated in the late 1960’s diverged from this pattern. Their English was heavily accented and they had difficulties understanding the questions that I posed.

While the Indian entrepreneurs had no intentions of moving back to their native country, they continued to uphold strong connections to India. One entrepreneur explained that he traveled back and forth between India and the US several times per year. Others made less frequent trips to India. The nine entrepreneurs did not only keep in touch with fellow Indians in their native country, but they were also involved with the Indian community in the Boston region. One entrepreneur described his engagement with local Indian organizations as “giving back to my community what they once gave me”.

Despite the fact that I found the nine Indian entrepreneurs to share many significant characteristics, their experiences also diverged in many aspects. When relevant, I will focus attention on the interviewees’ unique experience that has influenced their social tie approach and the kind of connections they developed. The following narrative may demonstrate the twists and variations of the experiences of the nine Indian entrepreneurs.

I grew up in the Gujarati region in India. After high school, I studied at the college of engineering in Nagpur, India. From there, I went to Great Britain to study business

administration. One of my advisors there happened to be an Indian professor. We became good friends and kept in touch even after he had moved to the US for a professorship at a Massachusetts university. This professor eventually launched his own software firm here in Boston. That's how I came to the US- he actually offered me a job at his firm. So I did the paper work and started at his firm in 1992. Four years later, I teamed up with two other more experienced Indian colleagues. We decided to start our own business. Today we have about hundred employees including a development center in Bangalore, India.

The entrepreneur depicted in the narrative owns an exceptionally large firm. Only two of the Indian entrepreneurs in this case study ran firms with about hundred employees. In fact, six interviewees represented firms with fewer than 25 employees while one entrepreneur's staff exceeded 30. However, all my interviewees' companies would be considered small when applying the US small business administration's classification of firms<sup>14</sup>. Accordingly, they conformed to the recent trend in the Boston high-tech milieu where small firms are considered to be the greatest driver of the sector.

The Indian entrepreneurs in this case study represented some fascinating companies. While some interviewees had sought out exceptionally specialized market niches, others were striving to diversify their products and services. The entrepreneurs' companies may be divided into three categories: six entrepreneurs ran firms with IT and software related products and services, one entrepreneur represented a company with engineering services and finally, two entrepreneurs offered architectural services. In the software industries, for example, one Indian entrepreneur explained to me that his firm was a wide provider of software solutions to industries such as financial services, health care, manufacturing/retail and government/education. "We provide a range of services that cover the complete application life cycle including project management, analysis, design, construction, testing, migration, management and integration". Another entrepreneur in a related industry had concentrated in a more narrow market niche and offered computer based mapping services (GIS) and CAD conversions. The one entrepreneur in engineering had specialized in the energy field. "Because the staff at my firm", he explained, "includes engineers, economists and lawyers, we are intimately familiar with the technical aspects of energy and environmental activities". "We target emissions reduction and plant efficiency". Naturally, the type of services offered at the

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<sup>14</sup> [www.sba.gov](http://www.sba.gov)

engineering firm drastically differed from the services provided by the computer related companies. Finally, the firms in architectural services had been involved in projects ranging from space planning to architectural designed business, commercial and residential buildings. “Our office is fully automated with state-of-the-art technology”, stressed one of the Indian architects.

Despite the entrepreneurs’ differentiation in specialization, products and services they all shared the same goals of innovation, growth and profit. The nine Indian entrepreneurs had not only based their start-ups on an incremental innovation in a service or product, but had also ensured that their firm continuously innovated. “It’s impossible to survive without innovating”, exclaimed one of the software entrepreneurs. Furthermore, when asked to describe the sophistication of technology at use in the daily operations of their firm, the entrepreneurs used expressions such as “very advanced”, “state-of-the-art” and “exceptionally sophisticated”. Their ambitions for growth and profit were evident when looking at the achievements of the various firms. For example, one Indian entrepreneur was the winner of the ‘Distinguished Small Firm Accomplishment Award’. Another had been qualified for the New England Technology Fast 50 program. This program nominates the 50 most rapid growth companies in the region, based on a five-year revenue growth. Other visible signs of profit and growth among the nine entrepreneurs were rapid increase in employees and spatial and technological expansion.

### **The Development of Connections**

When analyzing the fieldwork data, I found that the different categories of entrepreneurs (IT/software, engineering services and architectural services) used their connections so differently that they must be analyzed separately. Accordingly, the following two sections will solely discuss the IT/software entrepreneurs while the entrepreneurs from engineering and architectural services will be analyzed independently in the third subsection.

The Indian entrepreneurs who specialized in computer related industries were neither surprised nor confused when I asked them for an interview concerning their connections that they used during the daily operation of their firm. On the contrary, they

demonstrated a complete awareness of the importance of connections. Moreover, they could, without difficulty, name about ten ties that were especially important to their firm and which they spent a considerable amount of time maintaining. Those who specialized in computer sciences specifically believed that connections were absolutely critical when starting up your own firm. “You need a lot of guidance and advice as a prospective entrepreneur”, explained one of the more experienced software entrepreneurs. When the entrepreneurs were asked to name the three most important prerequisites to start up a high-tech firm, they typically included connections as one of the necessities. For example, one Indian software entrepreneur responded “You have to have a really good idea. Equally important is to have that extra special kind of passion. Then, of course, you need a lot of connections”. Further supporting the critical role of contacts during the early growth period is the fact that all the software/IT entrepreneurs mentioned ‘connections’ as the primary reason for locating their firm in the Boston region.

The decision to launch ones own firm had been made several years before the actual start-up. In three instances, it was an ambition the entrepreneurs had worked towards since childhood. One entrepreneur revealed that in his culture, children are raised to believe that the greatest achievement is to set up, or to run, ones own business. Accordingly, the IT/software entrepreneurs had given themselves plenty of time to prepare for, and research, the prospective sector where they would eventually launch their firm. In a similar way, the time-span had given them the opportunity to develop some initial relations necessary for the venture. For example, the entrepreneurs had been residents in the Boston region for 13 years, on average, before setting up their own firm. The field research revealed that a familiarity with the local high-tech milieu was crucial in order to successfully launch a high-tech firm. However, due to the different experiences and backgrounds of the Indian entrepreneurs, they used individual methods to reach a similar goal: the development of initial connections in the local high-tech sector. I observed four different approaches. Yet, some of the Indian entrepreneurs made use of two or more of the identified methods. First, entrepreneurs had the opportunity to take advantage of a research environment while pursuing graduate school at a local university. While they were working towards their graduate degree, Indian entrepreneurs in this case study focused on developing enduring relationships to key personnel on the



faculty at their respective educational institutions. Faculty, who often consisted of well-connected individuals, could then refer them to other individuals who might be crucial in the launching process. In other words, the pattern of transferring trust from an existing relationship to a newly established one was evident in the attempts of the Indian entrepreneurs to develop connections. Furthermore, one entrepreneur explained to me that when he pursued his MBA at a regional university he was not only able to develop relations to like-minded student mates, but also had the opportunity to form connections to local industry through the internships they were assigned. A second approach consisted of participating in the local Indian, high-tech business forum, the Indus Entrepreneurs<sup>15</sup> (TiE) that offered monthly lectures on the problems and impediments high-tech entrepreneurs encounter when running their firms. The lectures were constantly followed by a networking hour where entrepreneurs would get to know each other over a drink or a light dinner. Some of the lectures would specifically target prospective entrepreneurs. During these specific events, representatives from venture capital firms, banks and real estate agencies would participate and introduce the prospective entrepreneurs to relevant resources in the local environment. Accordingly, the Indian entrepreneurs in my case study who had pursued this approach had been able to form ties to both general actors in the environment and more experienced Indian entrepreneurs. Interestingly, they called the latter a ‘mentor’ relationship. The president of TiE<sup>16</sup> claims that the cross-generational mentorship relation has a long tradition in Indian culture originating from the guru-chela relation (teacher-student relation). A third method was to rely on connections to co-ethnic friends in the Boston area. These Indian friends were often relatives or other friendships that had been formed as a result of the immigration process to the US. As I have already mentioned, one entrepreneur could benefit from a friendship to an Indian former professor who had immigrated to the US from Great Britain. Thus, in this particular instant, a social relation was turned into an economic and business connection. Finally, developing some initial connections through a job in a high-tech firm in Boston was a method all the entrepreneurs in the computer related industries had pursued. When asked specifically about what kind of experience was the most important for the development of

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<sup>15</sup> To be discussed thoroughly in a following section

<sup>16</sup> [www.tie-boston.org](http://www.tie-boston.org)

ties, an entrepreneur typically responded: “to have a regular job in the high-tech sector”. Thus, Indian entrepreneurs in this case study had not only spent several years in an established high-tech firm such as Digital Equipment Corporation, but had also been professionally successful at their job. One interviewee informed me that when he functioned as a manager for a high-tech firm, his strategies had resulted in “the business growing from \$5.3 million to \$38 million in five years”. Accordingly, the IT and software entrepreneurs had the opportunity to gradually become familiar with different high-tech actors, high-tech firms and the general business environment in the Boston region through their jobs. Despite the different type or types of approaches that were used by the Indian entrepreneurs in this case study, the common factor was that they utilized the means in their approximate environment. This is in accordance with social theory suggesting that the *inter-personal* ties of the entrepreneur are specifically important in the early phases of the venture (Brown & Butler 1993). Moreover, the different methods used to establish some initial contacts that would be relevant for the start-up resembles an attempt to establish a *regional affiliation* to compensate for their outsider status as immigrants to the US.

Despite the efforts to establish a regional affiliation and become familiar with the actors in the high-tech sector through individual approaches, Indian entrepreneurs used words such as ‘complicated’, ‘not so smooth’ and ‘hard’ to describe the forming of some initial connections. “You don’t know who is out there, who can introduce you to customers. It’s a process of building up trust”, explained one of the entrepreneurs. Thus, being what Granovetter has called ‘a neophyte’ seemed to be a virtual obstacle when building relationships in the Boston high-tech environment. Moreover, by describing the development of some initial connections as a ‘process’ the entrepreneur confirms Larsson and Starr’s (1993) suggestion that actors gradually, in stages, expand and strengthen their relations. Another interviewee claimed, in a similar way, that the most challenging factor when developing connections was that “people were not familiar with the product I was offering. They couldn’t relate to it”. Finally, a third entrepreneur asserted that he himself was at fault for making the process of forming ties to other high-tech actors severely complicated. He explained that his ideas for the venture had not matured. “I had a lack of

understanding of my focus. I didn't really know what I was doing which resulted in developing the wrong sorts of ties".

### **The Connections in the Daily Operations of the Firm**

As discussed above, the role-set of the Indian entrepreneurs at time of firm set-up typically consisted of friends, university mates, colleagues and other acquaintances in the entrepreneurs' immediate surroundings. Furthermore, the entrepreneurs had spent an extended period of time in the Boston region, in order to develop enough connections to draw on in the early days of the firm's development. However, in the more established phase of the firm, the Indian entrepreneurs in this case study typically had to search for, and *select*, a few connections that provided them with sufficient resources and information critical to the daily operations of their firm. The issue was opportunity cost. In other words, due to the time and effort required to maintain a connection, the Indian entrepreneurs were forced to limit the ties they used on a routine-basis. Accordingly, interviewees maintained, on average, ten connections for the daily operations of the firm, while additional contacts were used more irregularly. Yet, the role-set used on a day-to-day basis was by no means static. One of the entrepreneurs explained to me that "when the market changes, one has to form new connections". Another interviewee stressed that "I have to develop my connections constantly to stay competitive". When taking into consideration the durability of the entrepreneurs' connections, the 'snapshot' of the respective role-sets the entrepreneurs provided me with appeared to be relatively stable over time. In the following, I will systematically analyze significant features of the Indian entrepreneurs' role-sets, commencing with informative connections.

The field research revealed that *informative* ties were exceptionally important for the entrepreneurs. An interviewee informed me that the expenses of an established software firm tend to be distributed between general and administrative costs (G&A), research and development (R&D), and sales and marketing. While G&A and R&D together make up 30% of the costs, sales and marketing amounts to 50% of the overall expenses. To reduce the cost of sales and marketing, explained the interviewee, it is crucial for an entrepreneur to single out contacts that consistently provide him with information on prospective clients and new markets. In other words, maintaining 'the

correct' informative ties appeared to be a competitive advantage for the interviewees in computer related industries. The field research further revealed that while the initial connections of the Indian entrepreneurs had consisted of friends and acquaintances, the informative ties used on a regular basis in the established phase of the firm mainly involved other firms. In fact, the Indian entrepreneurs specifically preferred to learn from firms, such as clients and suppliers. Moreover, in contrast to social theory, universities and research institutions did not function as a significant information source in the daily operations of the entrepreneurs' firms. The preference for seeking out information from other firms reflected the entrepreneurs need for specific knowledge and not general information. The knowledge that may solve immediate needs is most likely to be found in other firms in the context of the high-tech industrial district.

While theory suggests that the optimum informative ties are weak rather than strong, the interviewees argued that "trust" was the critical aspect of the informative contacts used on a regular basis. A CEO will not reveal any sensitive information to someone he has not built up a relationship with, explained one of the entrepreneurs. The strength of the informative ties was further reflected in their multiplexity and durability. For example, it was typical for an informative tie to also function as a collaboration partner on innovative activity. Moreover, the informative relationships had been developed over an extended period of time, often over several years. Yet, the interviewees' informative ties were not only of a strong character, but they also had a perfectly diverse structure. In fact, the field data demonstrated that the entrepreneurs' contacts were diverse beyond the original, theoretical meaning of diversity. I found that the Indian entrepreneurs had developed informative ties that were socially, spatially and ethnically diverse. The interviewees maintained between four and five informative connections on a regular basis. In the social meaning of diversity, none of these contacts were acquainted to each other. However, the interviewees were not aware of the *socially* diverse structure of their informative role-set. Interestingly, the specific structure of their informative connections was an uncalculated consequence of the entrepreneurs' attempt to form contacts that consistently offered them critical information on prospective markets. As a result, and illustrated by figure six, the interviewees received unique information from each contact.

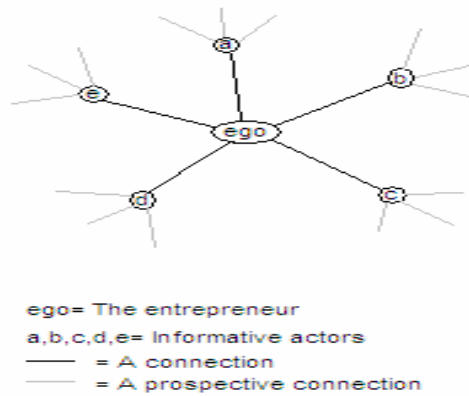


Figure 6. A model of the diverse structure of the interviewees' informative ties.

Especially intriguing, was the fact that one of the software entrepreneurs did not conform to the above illustrated structure of the informative ties. In contrast, all but two of his connections knew each other “very well”. However, this particular Indian entrepreneur’s firm was still in the early stages of growth (defined as the two first years) while the other entrepreneurs’ firms had reached a mature status (firms over 5 years old). Thus, the entrepreneur’s firm in the early stages of growth had not yet been through the transitional phase, where friends and acquaintances are replaced or supplemented by connections to firms. Naturally, friends and acquaintances are more likely to know each other than independent CEOs. As a result, and demonstrated by figure seven, this specific Indian entrepreneur did not have access to as many unique information sources as the more established entrepreneurs.

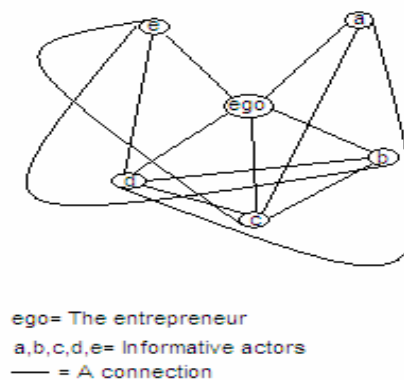


Figure 7. A model of the structure of the informative ties of the entrepreneur in the early growth period.

The Indian entrepreneurs in this case study also maintained spatially diverse, informative connections. While ties to other firms in the local high-tech sector were the most important, all the entrepreneurs had one or more informative contact in another national or global high-tech sector. For example, one entrepreneur upheld informative ties to actors in Silicon Valley. “That is where the innovation takes place”, he explained. “I learn from the market there”. Other entrepreneurs maintained external ties to other high-tech districts such as Bangalore, New York, Texas, and Singapore, depending on their prior individual experience. The interviewees believed that these external connections provided them with unique and crucial information they were incapable of receiving from the local informative ties.

Finally, the Indian entrepreneurs were convinced that relying on ethnically diverse informative connections was beneficial. One entrepreneur explained that as an Indian you not only have the opportunity to receive crucial information from mainstream actors in the high-tech sector, but you also have an additional ethnic community with high-tech experts to take advantage of. Yet, the informative role-sets were predominantly white and only supplemented with co-ethnic contacts. Surprisingly, co-Asian (excluding Indian) ties were completely absent in the Indian entrepreneurs’ role-set. When taking into consideration the actual presence of Asian high-tech entrepreneurs in the Boston high-tech sector as well as the suggested existence (see Sheth 1995, Hirabayaski 1998) of a Pan-Asian identity, it is puzzling that Asian connections do not play a more important role. However, it is worth noting, that I was not able to identify any signs of prejudice towards other minority entrepreneurs among the interviewees. It is plausible that the absence of Pan-Asian connections is correlated with a strategic factor, such as time efficiency. One of the interviewees offered a slightly different explanation, stressing that the Chinese were the sole Asian group significantly represented in the Boston high-tech milieu. Due to the Chinese entrepreneurs’ limited knowledge of the English language, the Chinese much prefer to interact within their own ethnic group, she claimed. Thus, according to my interviewee, it is the insularity of the Chinese high-tech community that prevents Pan-Asian cooperation. Nonetheless, it is worth noting that none of the Indian entrepreneurs had developed or upheld any informative ties to Black American high-tech

entrepreneurs, one of the other minority groups represented in the Boston high-tech sector.

While the computer based entrepreneurs in this case study spent a considerable amount of time nurturing their informative, strong connections, they also interacted with several weaker contacts on an irregular basis. These were typically contacts they met from time to time at the monthly events of a business forum. The interviewees would take advantage of one or more of the local, high-tech business forums for informative purposes. The business forums would invite selected entrepreneurs and other high-tech actors who would offer briefings on recent market trends, discussions on shared obstacles, and workshops on future opportunities in the global high-tech industry. More importantly, the business forums would bring together like-minded entrepreneurs in an informal and non-obligatory environment. Nonetheless, not all local business forums appeared to be instrumental. One interviewee revealed that “I was once involved in this networking forum that didn’t help me at all. So I quit. Now, I am involved in two very central and well functioning groups: Business Networking International and Massachusetts Software and Internet Council”. Other business forums that were mentioned were TiE, Software Services Business Forum, 128 Venture Capital Group, MIT Enterprise Forum and Massachusetts High-Tech.

Having analyzed the Indian entrepreneurs efforts to develop and maintain informative ties, I found that their behavior paralleled what the scholarly literature (Malecki & Poehling 1999, Oinas & Malecki 2002) has labeled ‘extroverts’. Malecki and Poehling, for example, have distinguished between ‘extrovert’ and ‘introvert’ firms depending on how active and successful they are in obtaining information from sources beyond their firm’s boundaries. Hence, the Indian entrepreneurs in this case study have the characteristics of extroverts, representing “outward looking” firms, constantly searching for the crucial knowledge that will keep them at the competitive edge. Their extroverted behavior encourage them to look beyond the local environment to seek information that will enable innovation other than that along the local high-tech district’s technological trajectory.

The field research further revealed that *strength* was a critical characteristic of the interviewees’ connections, irrespective of the resources that flowed through them. As

mentioned above, even the entrepreneurs' informative sources included durable and intense relationships that were used on a routine basis. Interviewees reflected the concept of strength in what they called "trust". Trust was typically mentioned as a prerequisite for a well functioning tie. Hence, from my understanding, trust, or what social theory has called 'strength', was the governing mechanism in the Indian entrepreneurs' day-to-day role-set. According to my expectations, strong relationships were a necessity for obtaining resources and collaborating on innovative activity.

As mentioned in my theory chapter, social network theory suggests that measuring the strength of a relationship includes looking at the frequency of interactions, the number of resources transferred through the tie, and the durability of the connection. When taking these factors into consideration, each entrepreneur in this case study possessed a qualitatively strong role-set. For example, ties were typically stable over a period of two to four years. Supportive contacts had the tendency to have aged with the entrepreneur for an extensive period, frequently over a decade. Furthermore, the interviews had their equivalent share of multiplex ties in their role-sets and typically met with their connections on a weekly or monthly basis. The homogenous pattern of strong relationships made me inquire into the origins of the strength. Interestingly, I found that the intensity of the interviewees' connections derived from the following sources: spatial proximity, emotion and a shared business vision.

Spatial strength originates from a shared regional affiliation. The actors in such a relationship share a regional industrial purpose and a social consensus. Accordingly, they are profoundly familiar with local ways of perceiving economic and technical problems and support the development of local informal support that encourages innovation, skill formation and the circulation of ideas among firms. The actors are further able to enhance the trust of the connection by regularly interacting on a face-to-face basis. Additionally, regional actors are likely to run into each other by coincidence at local high-tech events, such as business forums, trade shows and venture capital forums. Hence, as may be illustrated by figure eight, the strength of local connections originates from the organizational and spatial proximity. The interviewees maintained both *spatially strong* white and co-ethnic connections.



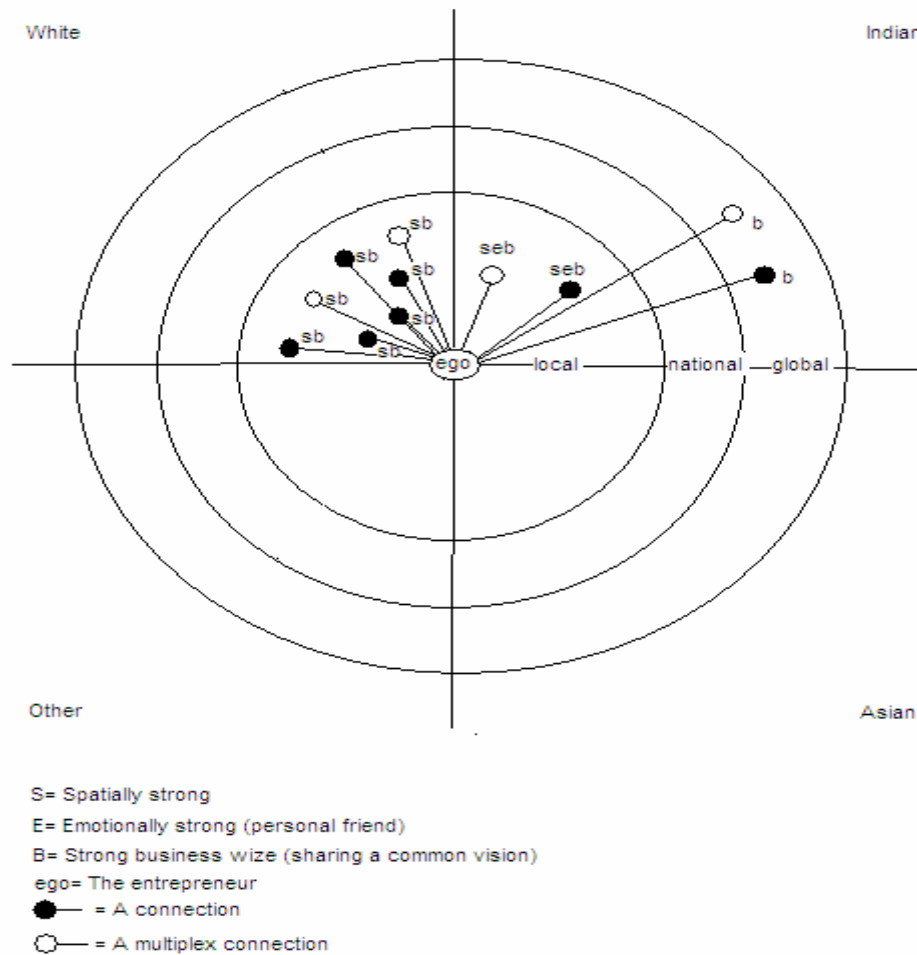


Figure 8. A model of the strength of the connections in one of the entrepreneur's role-set

Emotional strength concerns the degree of intimacy in the relationship. Intimacy tends to increase the ease of communication and improve the trustworthiness of behavior. As may be demonstrated by figure eight, the interviewees' local and co-ethnic relationships were specifically intimate in nature. For example, one of the Indian entrepreneurs described a co-ethnic contact as the following:

He actually lives in the neighborhood. He is a business colleague, a technology contact and a closer friend.

In contrast, the same entrepreneur defined a cross-race, national tie in the following manner:

He is a British contact living in California. He is the only representative of this British firm in the US. When I got in contact with the (British) firm, he was the one they referred me to. I don't see him much outside work.

It is the interpersonal similarity that produces the extra intimacy that characterizes co-ethnic, local connections. Similarity of identity not only engenders common interests and worldviews but also a unique predictability crucial to entrepreneurs in a volatile sector. However, as demonstrated by figure eight, cross-race ties were not the only category of connections lacking in emotional strength. Intriguingly, co-ethnic ties from local high-tech centers in India were referred to by the interviewees as “pure business ties”. In other words, despite similar interpersonal identity, co-ethnic global ties were not as intimate in nature as the local co-ethnic connections. The paradox may be explained by the fact that the shared experience of immigration among co-ethnic local actors strengthens ethnic identities that may not have been so strong in India. Distinctiveness theory, for example, suggests that similarity is relative to the context. That implies that “people in a social context tend to identify with others with whom they share characteristics that are relatively rare in the context” (Mehra et al 1998, p 442). Thus, two Indian entrepreneurs that develop an emotionally strong relationship in a white context, may not even have noticed each other, based on ethnicity, in an Indian context.

Finally, the field data revealed that the strength of a relationship might stem from a stable business partnership. The Indian entrepreneurs reflected a tie with strong business obligations as a “business friend”. The interviewees compensated the lack of intimacy in this category of connections with a shared vision of “growing for the future”. The partners were strongly aware of the mutual benefits deriving from a longlasting and reliable connection. Furthermore, as figure eight demonstrates, spatial proximity had no impact on the business strength of a relationship.

However, it is important to note that the strength of the entrepreneurs' ties is the researcher's interpretation in light of the scholarly literature on industrial districts. For example, some sociologists grounded in a very contrasting framework (Wilson 1998, Yoo 1998 ) maintain that strong ties must inevitably contain an emotional dimension. The same scholars also claim that strong ties are generally not utilitarian or economically instrumental but are rather affectionate relations to family, kin and close friends. A study

on migration networks following this specific sociological definition of strong ties (Wilson 1998) envisions a series of concentric rings describing the continuum from the strongest to the weakest connections. It is plausible that strong ties in view of the industrial district framework would be placed in Wilson's very outer concentric ring. In the industrial district literature, trust, durability, frequent interactions, and multiplexity are the determining attributes of stronger ties. Stronger ties are further contrasted to arms-length ties in which costs are everything and where actors do not have an interest in their partners' survival and success. Moreover, when focusing attention on actors' connections in an industrial district, researchers are solely interested in ties that somehow are of utility and contribute to an actors' firm. Accordingly, the strength of relations must be considered context dependant.

The interviewees believed that maintaining ties to *local firms, organizations and business forums* was specifically crucial for the competitiveness of their firms. Furthermore, they were convinced that spatial integration would facilitate social integration into the local high-tech industrial district. For example, one entrepreneur mentioned the "presence of other high-tech firms" as the major reason for locating his firm along Route 128. Another entrepreneur claimed that "connections" and the "availability of talent in the area" attracted him to set up his firm in Cambridge. Thus, as may be illustrated by figure nine, the interviewees had located their firms in the high-tech agglomerations in Cambridge and along the following high-tech routes: 128, 495 and 93.

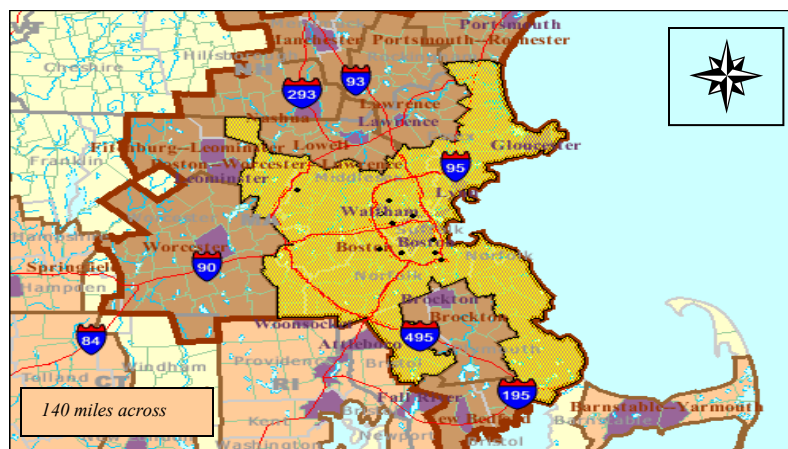


Figure 9. The location of the interviewees' firms. Source of the map: the US Census Bureau

Thus, in contrast to a few Chinese high-tech entrepreneurs who have chosen to locate their firms in Chinatown<sup>17</sup>, a local ethnic enclave, the Indian entrepreneurs in this case study had perfectly integrated into the agglomerations of high-tech industry in the Boston metropolitan area. The spatial location of their firms was further an effort to demonstrate their incorporation and understanding of local industrial behavior and values. By setting up their firms within the high-tech agglomerations, they were not only in geographical proximity to other similar firms, but also to business forums critical for informative purposes. One entrepreneur revealed that it was important for him to be located close to his previous employer. Colleagues from his former workplace would function as advisers and sources of information on new technology. Hence, the entrepreneurs' decision to locate within the high-tech agglomerations was not only an effort to enhance their regional affiliation but also of direct practical necessity. Moreover, and exemplified by the photo below, the Indian entrepreneurs' offices were typically situated in a multi-story office building along the highway, surrounded by similar high-tech firms.



Photo no 1. A typical business building in the high-tech agglomeration of Cambridge

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<sup>17</sup> [www.uscensus.gov](http://www.uscensus.gov) See 5% PUMS data 2000

While the Indian entrepreneurs perceived spatial integration into the local high-tech milieu as a priority when setting up their firms, they also believed that social integration namely, the development of local cross-ethnic (white) contacts was necessary for functioning effectively in a white-dominated context. “The regional environment is most important for the day-to-day operations”, explained one interviewee. More specifically, the field data revealed that local cross-ethnic ties were predominantly used to decrease the costs of the sales and marketing process. As mentioned in a previous section, a typical software firm used 50% of their annual revenues to expand their clientele base. Thus, the local high-tech network assisted the interviewees in keeping abreast on opportunities in the market. In the words of one of my Indian interviewees:

My local white connections are most important from a marketing and sales perspective. They help me get in touch with new clients.

Furthermore, the interviewees were convinced that integration into the local high-tech network was significant for spurring innovative activity within the firm. Innovation occurred in three separate, but complementary, processes in my interviewees’ firms. First, the interviewees used connections to non-client high-tech firms to come up with new ideas. Secondly, innovation was a collaborative process between the entrepreneurs’ firms and their clients. Finally, innovation occurred within the firms R&D department or through ties to an external development center. While the third innovative process was unrestrained by spatial proximity, the two first processes were dependant on connections within the local high-tech network. Accordingly, integration into the Boston high-tech milieu was fundamental for several reasons.

However, the interviewees did not perceive the local high-tech milieu as receptive to minorities. Two of the entrepreneurs claimed that their view of Boston as a non-inclusive environment was based on personal experience. Interestingly, one of the entrepreneurs contrasted the Boston high-tech sector with Silicon Valley. “It’s not like the west coast here”, he explained. “It’s more difficult. Silicon Valley is like another country.” He also revealed that he had rather set up his company on the west coast, but family relations tied him to Boston. The other interviewees grounded the hostility of the milieu on the actual numbers of minority high-tech establishments. The skepticism towards the foreign stream

of high-tech professionals has been reflected in the local media. Jim Marone, the editor of Mass High-Tech<sup>18</sup> wrote at the end of last year that “to say the labor market in high-tech is complex is like saying quantum physics is hard. There’s the H-1B visa program; the L-1 visa program<sup>19</sup>; the burgeoning trend of outsourcing high-skill jobs to places like Russia, India, China and Brazil; and real people here in New England and across the country out of work.” The hostility towards foreign workers is spurred by the fact that 94 000 computer scientist in the US are unemployed. A popular opinion is that unemployment is connected to some foreigners willingness to work long hours for less compensation than their white counterparts. The Boston Globe told the story of the software programmer John Malley on November 3, 2003.

John Malley trained the foreign programmer who replaced him in his own Boston office. Malley, 41, lost his job the following spring. Neither he nor his partners will say why. But when he left, Partners gave one of the Indians his job. Malley has yet to find steady programming work, and he blames the visa program.

Nonetheless, analysts who study workplace issues<sup>20</sup> call workers’ anger towards the H-1B visa program misplaced. High-tech companies in the Boston region only use H-1B workers to fill jobs for which they cannot find qualified Americans. Moreover, the local government has recently set up detailed rules for how much professionals in the high-tech industries must be paid. Hence, the hiring of foreign workers goes on despite the lingering unemployment among computer scientists.

As demonstrated by these quotations, local media has made explicit the ethnic group competition currently characterizing the Boston high-tech sector. The mainstream high-tech workers feel threatened by the foreign individuals who possess difficult-to-find skills. Nonetheless, the Indian entrepreneurs in this case study assured me that they had not become targets for the anger of native high-tech workers. On the other hand, the interviewees’ examples of the high-tech milieu’s hostility very much resembled what theory has called “the other side of embeddedness”. When asked specifically about being confronted with skepticism from the mainstream, an entrepreneur responded that it

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<sup>18</sup> [www.masshigh-tech.com](http://www.masshigh-tech.com)

<sup>19</sup> The visa programs are foreign worker programs that allow degreed professionals to engage in employment in the US in specialty occupations.

<sup>20</sup> for example Maria Schafer at Meta Group Inc quoted in The Boston Globe, November 3, 2003

occurred predominantly in the initial stages of developing a relationship. “For example, this guy just wanted to talk baseball instead of technology. We couldn’t connect.” Hence, the situation may reflect an instance where an established high-tech actor is incapable of developing trust with a ‘neophyte’ who also possesses a different identity. In other words, it appears to be the unintended consequences of the nature of economic action the two entrepreneurs have been subject to. Furthermore, since the interviewees were well anchored in the region and possessed similar social backgrounds to the mainstream, it is likely that ethnicity produced diverging identities.

Intriguingly, two different entrepreneurs in my case study puzzlingly claimed that the high-tech milieu was simultaneously hostile to minorities, but welcoming to Indians. One of them explained that “it’s actually an advantage to be Indian in comparison to other minority groups. Perhaps also in comparison to the mainstream. As an Indian you are just singled out as being skilled!” Another entrepreneur informed me that “it was probably more difficult (to be Indian in the high tech sector) ten years ago. Boston’s high-tech milieu is changing”. In accordance with the latter interviewee, I interpret the Indian entrepreneurs’ ambiguous experiences in the local high-tech milieu as an indication of the sector’s current stated transition. More specifically, it appears that the high-tech milieu is transforming from a conservative and white dominated arena to a more open-minded and pluralistic environment. The recent shift to software as a core industry in the Boston high-tech sector, may especially have worked in favour of the Indians, who are known for their expertise within the field. Nonetheless, the current inclusion of minorities in general may be supported by a statement by the executive director of TiE<sup>21</sup>. She claims that the most recent downturn has created a “sort of a comradeship among the local entrepreneurs. They all dealt with the same problems, they were all suffering. Therefore they felt comforted by each other.” Thus, while the historical downturns have worked against the inclusion of minorities, the most recent downturn may have had the very opposite effect.

From a personal interview with the executive director of TiE, I understood that TiE had played an important role in facilitating Indian entrepreneurs’ integration into the local high-tech sector. TiE started in the beginning of the 1990s with three Indian

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<sup>21</sup> Personal interview with the executive director of TiE

entrepreneurs from Silicon Valley. As they were waiting at the airport for an Indian government official visiting Silicon Valley, the three entrepreneurs began to discuss the problems they encountered when running their high-tech businesses. Surprisingly, they realized that they were struggling with the same obstacles but had nobody to share these with. As a result, they founded an Indus<sup>22</sup> networking organization that would promote entrepreneurship and function as a mentoring organization for Indus high-tech entrepreneurs. A few years later, a TiE member with strong connections to the east coast initiated a second TiE chapter in the Boston region. The Boston office is modeled after the Silicon Valley chapter and is today the second largest out of 42 chapters around the world. Furthermore, there are three communities within TiE: general members, charter members and sponsors. While the general members are entrepreneurs, or prospective entrepreneurs that pay a small fee for membership, the charter members are outstanding entrepreneurs, selected by the charter board. The charter members contribute financially (at least \$1000 per year) but also socially. For example, they function as mentors for the younger, more inexperienced entrepreneurs. The sponsors, on the other hand, consist solely of corporate donators. While the *Indus community* was the initial strength of TiE, the organization's message is equally relevant to all entrepreneurs, whether they are of Indus origin or not. Moreover, to facilitate Indus entrepreneurs' integration into the mainstream network, TiE is currently building relationships with other business forums through the "Alliance Partnership". According to the executive director of TiE, the Alliance Partnership is an attempt to:

team up with the other central networking organizations in the area. The most important ones have been MIT Enterprise Forum, Massachusetts Software Council, Massachusetts Biotech and Massachusetts High-Tech. We give entrepreneurs from these forums the chance to take part in networking events for the same price as our members. In return, they do the same for our members. Recently we have started a project where we broadcast events jointly. Today, around 15% of the entrepreneurs that turn up for our events are members from these other networking groups. However, our goal is to have a more even ratio.

Thus, by organizing joint events with central business forums, TiE has established a neutral setting where high-tech entrepreneurs, irrespective of ethnicity, may build

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<sup>22</sup> The Indus region includes India, Pakistan, Nepal, Sri Lanka, and Bangladesh



relationships to other actors in the area. Consequently, TiE now also stands for “Talent, Ideas and Enterprise”.

TiE has further targeted another common problem among Indian entrepreneurs, namely that of gaining credibility among local bankers and venture capital firms. One of the entrepreneurs in my case study claimed that he had personally experienced the skepticism from financial actors. His experience is further supported by another entrepreneur who had “Indian friends who had not been taken seriously by bankers and businessmen.” Furthermore, an interviewee informed me that “most Indian entrepreneurs solve this problem by scrapping their own savings. Then they go to their family and friends.” However, TiE has recently set up a program, *The TiE Venture Forum*, where they link prospective entrepreneurs with the local financial world. The forum collects business plans from prospective high-tech entrepreneurs, reviews them and singles out the most promising. After improving them in collaboration with the entrepreneurs, the best business plans are presented at an event where local bankers and venture capital firms are present. “A couple of months ago, we had a guy who got \$15 million from investors” revealed the executive director of TiE.

Finally, TiE has made it plausible for Indian high-tech entrepreneurs to locate one another within a white dominated context. Thus, in contrast to my expectations, the under representation of Indians in the high-tech sector has not been a major obstacle for Indian entrepreneurs in this case study to interact with other Indian entrepreneurs. Nonetheless, the Indian interviewees deliberately sought out mainstream, *non-Indian ties* in the local environment in order to function effectively. As a result, they must manage to overcome the barriers directly related to diverging identities, or what I previously have called ‘the unintended consequences of the nature of economic actions’. In fact, the interviewees demonstrated a remarkable inventiveness and ingeniousness when striving to develop ties to local cross-ethnic actors. The field data revealed that the entrepreneurs made use of individual approaches in their attempts to socially integrate into the local high-tech milieu. I have singled out seven main courses of action. First, entrepreneurs made an effort to adopt those aspects of the dominant culture necessary to establish trust in a cross-ethnic relationship. Accordingly, they strived to develop expertise in shifting between different business cultures, namely their own ethnic milieu and the larger space

of the mainstream. Schnell and Sofer (2003 p. 305) have labeled this approach “Janus face” after a two faced Roman god. Naturally, the entrepreneurs’ ability to relate to cultural codes of the mainstream’s business milieu varied. The entrepreneur, who was most successful in his endeavors had been “exposed to American values already in childhood” by attending an American school in his native country. Secondly, entrepreneurs strived to focus attention away from ethnicity to alternative interpersonal similarities. For example, one entrepreneur explained that “these (cross-ethnic) contacts are representatives of rather small firms like my own. Therefore, it has been easier to develop close relationships”. In this instance, the interviewee had overcome ethnicity by focusing on the shared experience of managing a small firm. A third approach consisted of taking advantage of contacts from a prior working experience. Interviewees were typically able to transfer the connections that their previous employer maintained to their own start-up. Benefiting from their cross-ethnic personnels’ channels of information and cooperation was a fourth common method. By employing computer engineers and business administrators with extensive experience in the local high-tech sector, the Indian entrepreneurs ensured to enhance their own personal role-set with their employees. For example, one entrepreneur revealed that his firm had “just employed a new marketing person. He has 20 years of experience within the field and is remarkably well-connected.” A fifth approach involved overcoming ethnic barriers by establishing credibility among local high-tech actors. The interviewees believed that they had to surpass other firms’ accomplishments in order to achieve trustworthiness. An interviewee informed me that “the Boston high-tech network is such a small community. Your reputation will spread quickly. As long as you prove that you are reliable and competitive, you are fine.” A sixth course of action, involved participating in one of the local business forums where a shared vision of profit and growth is gradually transcending ethnicity. For example, during workshops high-tech actors would bond over the common effort of solving technical and financial obstacles encountered in the daily operation of their firms. Finally, an inventive approach that was adopted in order to form contacts with mainstream central *firms* was to take advantage of connections to *co-ethnic employees* in the lower echelons of these corporations. In this instance, the Indian

entrepreneurs have had to compromise the benefit of having high-status personal contacts, with that of being connected to critical firms in the Boston high-tech sector.

The inventive approaches employed to integrate into the mainstream was an attempt to grasp opportunities and talent in the regional environment. Yet, this ambition was not equivalent to abandoning their co-ethnic relations. Cross-ethnic ties were skillfully balanced with co-ethnic relations. As mentioned in a previous section, co-ethnic ties were not only technologically instrumental but had an *emotional* and *supportive* dimension that most of the cross-ethnic relations lacked. As a result, the interviewees deliberately maintained two social circles of ties: the co-ethnic and the cross ethnic. They were, thus, able to function effectively in a white dominated context as well as reaping the benefits of psychosocial support from their own ethnic community. As illustrated by figure ten, the ratio between co-ethnic and cross-ethnic connections varied. The interviewee who was most dependent on co-ethnic ties had a 50/50 ratio. Accordingly, the usage of local cross-race connections was partial and non-emotional.

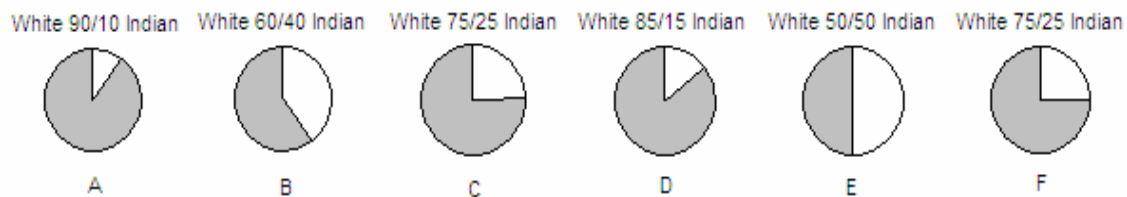


Figure 10. Models of the ratio between White and Indian local connections among the Indian entrepreneurs in this case study

The Indian entrepreneurs in computer related industries specifically benefited from the regional environment in regards to sales and marketing and the R&D process. However, The interviewees also took advantage of *external relations*. None of the interviewees were entirely dependant on the local milieu. As mentioned in a previous section, the entrepreneurs were convinced that external ties were particularly significant for informative purposes. The geographical location of informative connections was totally dependant on the interviewees' individual backgrounds. In other words, they were spread irregularly over national and global space. In contrast, the final stage of the

innovative process typically took place in a development center in one of the high-tech agglomerations in *India*. One entrepreneur claimed that “everybody has to do some kind of offshoring to survive”. Interviewees believed that transnational connections to India were specifically important from an R&D perspective. When asked specifically about relations to a development center in Bangalore, one entrepreneur explained that:

It’s an R&D company. Basically, it’s like our daughter company. We are the financiers and we communicate daily with them. This guy that I have called (A) travels back and fourth between Bangalore and Boston. We do the technical development over there. People are very skilled and salaries are low. It’s a huge advantage for us. I meet with my clients in Boston and we discuss an appropriate solution for their GIS development. Then I explain the situation for (A) and he has got a team of Indians in Bangalore who will take care of the technical side of it. Personally, I also travel to India frequently to check on the guys.

In a similar way, another entrepreneur claimed that “with the industry’s best off-shore facilities and infrastructure, we provide the most reliable software development environment to our clients. Our approach, offshore facilities and time-zone advantage enable us to offer unique development and support services.” However, working around the clock and employing India’s skilled and cheap computer scientists in the R&D process, have not been an initial function of the interviewees firm. Interviewees explained that it had developed gradually as an important competitive advantage. In fact, two of the interviewees had not yet implemented their plans to outsource parts of the R&D process. One of these entrepreneur explained that he wished to expand nationally before attempting to offshore R&D activities. The other interviewee claimed that data security, his firms specialization, had not been an issue in India yet. Therefore, it was severely difficult to find skilled computer scientist within this field in India. Accordingly, these two entrepreneurs were still dependant on local in-house facilities.

Based on the field data I was able to single out two dominant social tie models that capture the most important spatial features of the interviewees’ role-sets. The first one, exemplified by figure eleven, is a national delivery model, where external ties from national high-tech centers supplement local connections. What specifically characterizes this business model is the fact that all the stages of innovative activity occur within the

local industrial district. Accordingly, the model represents the Indian entrepreneurs who lack transnational ties to India or to other global high-tech centers.

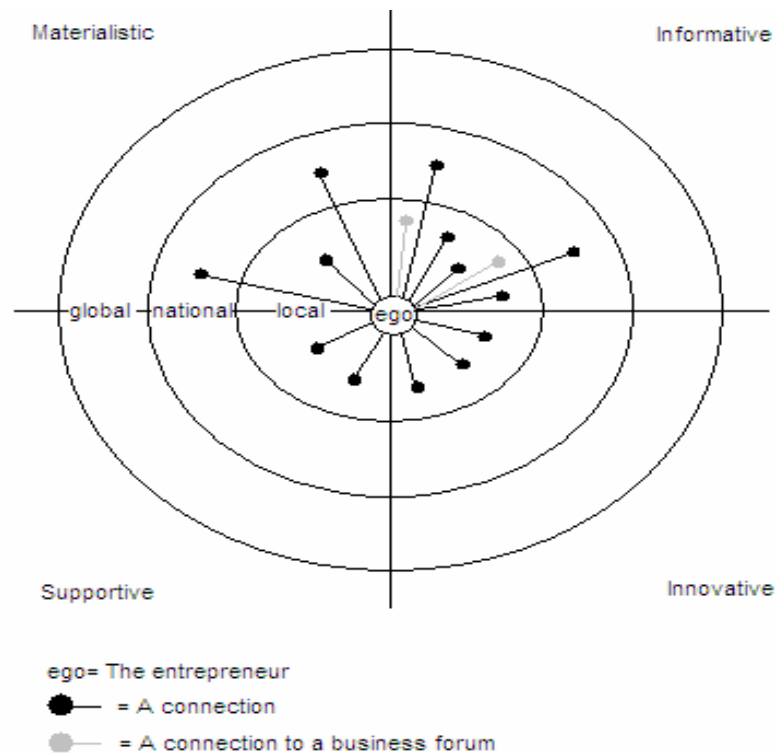


Figure 11. The national model of the spatial aspects of an entrepreneur's connections

In equivalence to the national model, the global delivery model cements the importance of regional connections. The entrepreneurs conforming to the global delivery model, however, have transcended national borders and are profiting from overseas expertise and cost-savings. More specifically, by maintaining complementary connections to their country of origin the interviewees have managed to outsource the very costly stage of the innovative process. While both of the business models secure the Indian entrepreneurs from stagnating processes, such as 'groupthink', only the second delivery model, exemplified by figure twelve, constitutes a significant financial benefit. Accordingly, the entrepreneurs employing the global tie-model have turned their ethnicity into a competitive advantage.

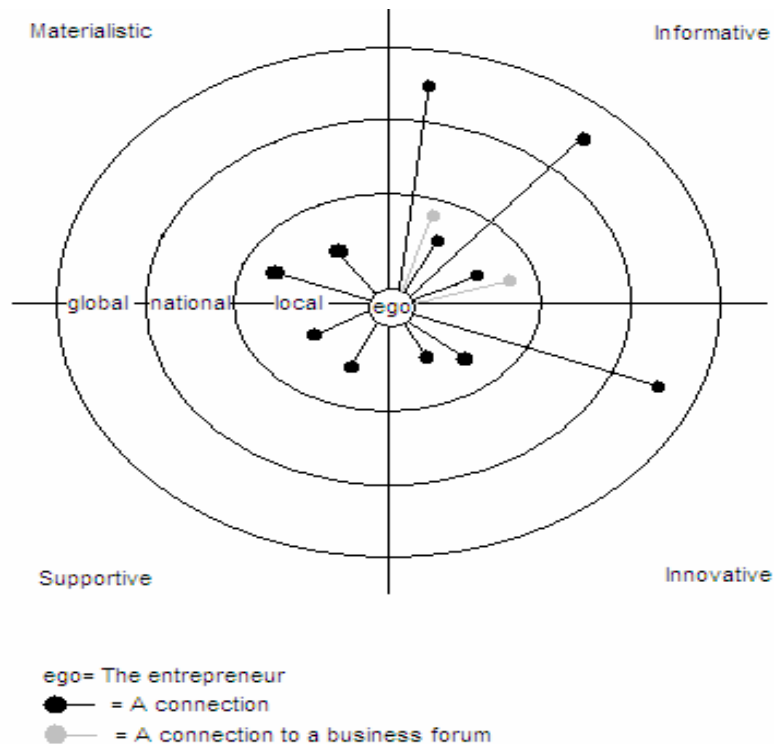


Figure 12. The global model of the spatial aspects of an entrepreneur's connections

Intriguingly, the interviewees who had implemented the global delivery model were surprisingly secretive about their approach. Only when asked explicitly would they elaborate on their ties to a development center in India. The particular discretion regarding outsourcing activities may be a consequence of the strong reactions from local high-tech workers. Outsourcing coincided and may have contributed to the recession in the early 2000s in the Boston region. One entrepreneur explained that “a while ago it (outsourcing) was the topic of the day. Now it has become a political issue.” In fact, Indian professionals say that the outsourcing backlash is felt most in Boston. “Firms are employing locals as project/team leaders so that the team is in a better position to handle the situation in case of an uproar.”<sup>23</sup> Yet, the use of computer scientists in India by Boston based Indian entrepreneurs is only likely to grow. Today, local Indian entrepreneurs are not the only group using outsourcing as a competitive advantage. Close

<sup>23</sup> India Business Insight, March 2, 2004

to 200 of the Fortune 500 companies carry out parts of their R&D process in India<sup>24</sup>. “Outsourcing is in full bloom” in the words of the executive director of TiE.

Despite the cost-savings related to the global delivery model, figure twelve plainly demonstrates that connections to India have not replaced the importance of local ties. The interviewees made clear that local and external contacts fulfill different purposes. For example, one entrepreneur informed me that “ they (connections to India) are crucial to us for technological reasons. However, we can’t survive without our connections to clients here in Boston.” Moreover, in contrast to my expectations, it did not seem to be the exclusionary pressures of the local milieu that had spurred the Indian entrepreneurs to take advantage of transnational connections to their country of origin. Due to the transitional status of the Boston high-tech milieu, the interviewees had not been confronted with the degree of skepticism that I had anticipated. Furthermore, since local and external ties complement each other, external contacts can never compensate for a lack of regional anchoring. Instead, objectives such as growth and profit drove the Indian entrepreneurs to take advantage of technology experts in India. The interviewees already had the language and the culture to function effectively in an Indian high-tech environment. In fact, during one of the workshops at TiE, Indian entrepreneurs revealed their plans of expanding outsourcing activities to other areas of their firm, for competitive reasons. For example, huge cost-savings are plausible in the process of marketing and selling products. While the Indian entrepreneurs who were present at the workshop agreed on that sales and marketing will always partially involve a face-to-face relationships, they acknowledged the possibility of initiating certain stages of the process offshore. Perhaps, this will be my interviewees’ next inventive course of action to remain at the competitive edge.

### **The Impact of Technology**

When analyzing the impact of technology, it is important to bear in mind that technology is affected at the most profound level by the society in which it is produced. More specifically, technology will always be surrounded by social, economical and cultural circumstances that condition its creation, outcome and use. I distant myself from theories

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<sup>24</sup> [www.masshightech.com](http://www.masshightech.com) June 9, 2003

that claim technology is an external, autonomous force that exerts an unprecedented influence on the social world. In contrast, I argue that technology and society are inextricably bound together and the traffic between the two is reciprocal. Since technology is a socio-technical product, the very social factors that shape technology also have an impact on the social implications of technology. Having said this, I am now in a position to analyse how technology, embedded in a particular social system, has influenced the connections that Indian entrepreneurs make use of.

The field data revealed that the role-sets of Indian entrepreneurs from technologies such as engineering and architectural services differed drastically from their counterparts' connections in computer-based technologies. This was true despite the fact that the interviewees had remarkably similar backgrounds. In other words, the individual experiences of the entrepreneurs were not sufficient to explain the diverging usage of connections among entrepreneurs from dissimilar technologies. However, the functional, socio-cultural and institutional/legal conditions of the different technological systems (techno-system) were instrumental in explaining the characteristics of the entrepreneurs' ties. For example, in regards to the functional conditions, the factor inputs needed to run a business (i.e. labor, knowledge, materials and components) varied greatly between IT/software, architecture and engineering technologies. Consequently, only the software and IT entrepreneurs acknowledged and confirmed the particular network structure outlined in chapter three. The architecture and engineering entrepreneurs who were dependant on disparate factor inputs were alien to such an organizational setting. Furthermore, interviewees from separate technologies were not confronted with the same obstacles to solve affecting the type of relations required, and the geography of these relationships. With concern to the socio-cultural conditions, the degree of discrimination and the social conservatism of the technological communities had a significant impact on the ethnicity of the connections that the entrepreneurs had formed. Finally, institutional and legal conditions of the techno-system such as government regulations partially shaped the spatial aspects of the interviewees role-set. As a result, entrepreneurs from different sub-technologies have to be analyzed individually. Several entrepreneurs from non-computer industries were, unfortunately, not willing to take part in my study. They argued that "the questionnaire is not relevant to my business model". However, three



entrepreneurs from the engineering and architectural fields agreed to assist me in developing a more thorough understanding of their specific social tie-model.

An Indian entrepreneur who I will call Mr Patel, had specialized within energy engineering technologies. By immigrating immediately after the Immigration and Naturalization Act of 1965, pursuing his graduate degree at Harvard University and spending 14 years working at a local high-tech firm, Mr Patel displayed similar background characteristics as his Indian counterparts. Nonetheless, Mr Patel's role-set was fundamentally different from the Indian computer entrepreneurs. The interviewee was not only detached from the local high-tech milieu, but he also revealed a comprehensive independence from geographical space. In contrast to the business model of his fellow Indian entrepreneurs, Mr Patel's delivery model was unique, vast and complex in nature. As demonstrated by figure thirteen, the unique aspect of his model was the fact that Mr Patel did not base the operations of his firm solely on his own connections. On the other hand, he explained that he took advantage of the role-sets of a team of key employees with international expertise within the energy field. Mr Patel employed the global arena as his recruitment base to secure that his key staff included the most qualified experts in the industry. Moreover, he had ensured that his key staff individually mastered at least two languages in order to function effectively in his globally-oriented firm. Mr Patel also revealed that he required his team of key-employees to have prior experience in working with foreign governments and multilateral donor agencies. As a result, he had secured an exceptionally well connected core of key employees. One of his team members was:

a former employee of Price Waterhouse Coopers and the World Bank. Mr (A) served as a Principal Consultant at PWC and Senior Power Engineering for the Energy Division at the World Bank. Mr (A) has worked throughout the world on electricity sector restructuring with focus on restructuring and privatization. He has more than 35 years of energy industry experience with energy research institutes, universities, national and international organizations (International Atomic Energy Agency, Vienna and CNEN, Italy), the power industry, international financial institutions (The World Bank) and consulting organizations. He has extensive emerging energy market experience and has worked in such diverse countries as Romania, Bulgaria, Macedonia, Yugoslavia, Ukraine, Turkey, Italy, Germany, Egypt, India, Bangladesh, Pakistan, Kenya, Zimbabwe, and the USA. He is proficient in Serbo-Croatian languages, Russian, Italian and French. He also has a Master of Science in Power, Nuclear Engineering, University of Belgrad, Bachelors, Power Engineering, University of Belgrad.

The core of key individuals in Mr Patel's firm further functioned as his source of psychosocial support. Thus, in contrast to the Indian computer entrepreneurs in this case study, Mr Patel had no supportive connections beyond the boundaries of his firm. When adding up the role-sets of Mr Patel's core employees, the entrepreneur had an enormous amount of critical connections at his disposal. Thus, while figure thirteen is an attempt to illustrate the characteristics of Mr Patel's delivery model, it cannot not do justice to the variety and scope of connections that the interviewee and his team of key colleagues maintained.

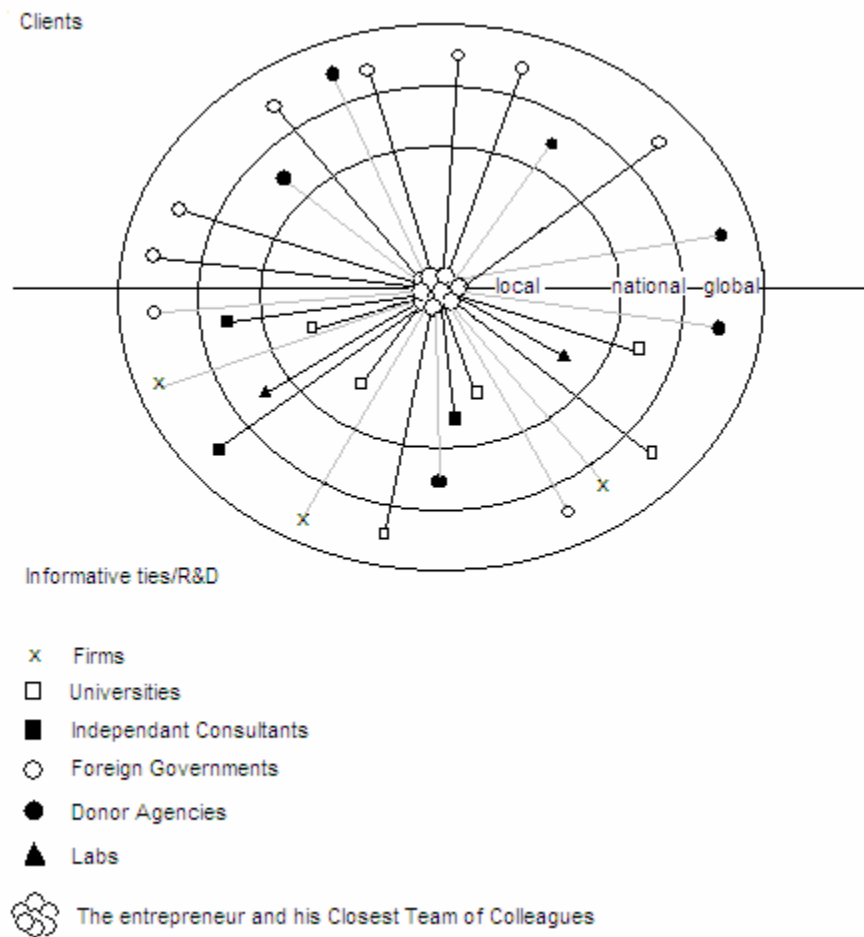


Figure 13. The Indian entrepreneur's delivery model from the energy-engineering field

Another fundamental difference between my interview from the energy-engineering field and the computer-based entrepreneurs was Mr Patel's variety of sources of contacts. In

other words, Mr Patel informed me that he not only made use of connections to other firms, but also upheld ties to universities, multilateral donor agencies, independent consultants, foreign governments and labs. While the regional high-tech milieu was critical to the Indian computer entrepreneurs, the environment was only significant to Mr Patel in the sense that he took advantage of “a variety of top-talent” in the engineering departments and labs of local universities. Interestingly, the charter members of TiE had selected Mr Patel to become a lifelong charter member, which is the most honorable membership and only offered to particularly successful, local entrepreneurs. However, Mr Patel confirmed the insignificance of the high-tech milieu by stressing that “they (TiE) are IT guys. I used to be involved with them and go to their meetings but it was not relevant for me. They are in a very different technology than I am.” Furthermore, since experts from national and international education and research institutions were equally important to Mr Patel's firm, locality did not play a particularly prominent role. However, ties to local, national and international universities and labs were crucial for both informative and R&D purposes. For example, in regards to the R&D process, innovation took place in two complimentary stages. First, innovation occurred in collaboration with selected universities and labs and second, within the R&D department of the firm.

In contrast to the IT and software entrepreneurs in this case study, Mr Patel explained to me that the only beyond firm connections that were important for the competitiveness of his firm were ties to clients and informative/R&D relations. Furthermore, while a fraction of the informative/R&D contacts were locally based, connections to clients were entirely sought out on a global scale. Mr Patel's firm had worked on energy engineering projects in over 30 different countries, mostly in the developing world. As a result of the focus on developing countries, not only did foreign governments function as the primary clientele base, but Mr Patel also worked on commissions by bilateral and multilateral donor agencies, such as USAID, UN, EBRD (The European Bank for Reconstruction and Development) and the World Bank. Furthermore, many of his clients were important information sources. The ‘grey’ connections to the donor agencies as well as to firms and selected foreign governments in figure thirteen, indicates a less strong relationship only at use on an irregular basis. In other words, these were employed according to need or on a project-to-project basis. In

contrast to the Indian computer entrepreneurs, Mr Patel and his core team managed to more evenly balance strong connections with a weak set of ties.

Mr Patel further explained that global connections to firms were utilized to retrieve local knowledge about the energy sector in the countries that his firm were working in. “We also maintain a Partnership of senior and mid-level independent consultants” for similar purposes, he revealed.

While the computer entrepreneurs in this case study maintained transnational connections to their country of origin, Mr Patel clarified that due to the specific technologies at use in his firm he was unable to take advantage of India’s booming high-tech industry. In fact, he did maintain connections to the Indian government as a result of a prior environmental project that his firm had accomplished in the country. However, these connections were not more important than the 29 other governmental relations his key employees maintained worldwide. When asked specifically about the ethnicity of his connections, Mr Patel informed me that “they are all Caucasian” (white). Moreover, he added, “I can’t look for ethnicity when I develop connections, I only look for talent.” Accordingly, the knowledge intensity of Mr Patels’ firm spurred him to seek out connections to energy experts and clients on a global scale.

The second set of entrepreneurs who diverged from the Indians from the IT/software technology were two entrepreneurs specializing in architectural services. These interviewees were post-1965, student-turned immigrants with over a decade of working experience with local high-tech firms. Coincidentally, they both ran firms with only four employees. The two architectural entrepreneurs used a much less complex social tie model than the Indian entrepreneurs from computer and engineering technologies. In fact, most activities occurred in-house and not in collaboration with actors from a technological milieu. For example, the interviewees briefed me that only informative ties were significant for the day-to-day operation of their firms. The entrepreneurs actively sought out four different types of information: information on emerging technologies, information on regulatory issues, information on the state-of-the-art of their architectural specialization field and information on prospective clients. Information regarding the three first issues was not only important for functioning competently as an architect, but also crucial for developing trust to a prospective client.

One of the entrepreneurs explained that “success lies in the professional, business and personal relationship between owner and architect.” Because of the intense cooperation between the owner and the architectural firm, the chemistry has to be perfectly right. More importantly, the architectural firm is expected to provide the prospective client with information about such diverse factors as site-use, environmental regulations, planning and zoning applications, energy costs, drawings, models and presentations.

Based on the field data, I found that information on clients might be obtained through four different approaches. In most cases, the client actually seeks out the architectural firm and assigns the project only after in-depth interviews. However, one of the interviewees revealed that thoughtful architects are as careful in selecting their clients as owners are. Owners may award an architectural firm a project by selecting from a database of architects that most architectural organisations maintain. Alternatively, they may choose by reputation, or what one of the entrepreneurs called “word of mouth”. Once you have successfully designed a facility, your reputation will spread through the elite community, explained the entrepreneur. Furthermore, architects may more actively seek out prospective clients by consulting previous colleagues and other firms in the industry. Finally, the entrepreneurs may enter architectural competitions often held in collaboration between an architectural organization and an owner.

As may be illustrated by figure fourteen, the two Indian entrepreneurs, intriguingly, consulted diverging sources to retrieve the necessary type of information. By utilising connections to other architectural firms, former colleagues and business forums, entrepreneur B’s role-set resembles the inter-firm model adapted by the IT/software entrepreneurs discussed earlier. In contrast, entrepreneur A employed a much more institutionally oriented role-set. For example, architectural organizations such as the Boston Architectural Center provided this interviewee with information and tools necessary to create a competitive advantage in the market. They not only offered monthly lectures and briefings on design issues relevant to his specialization, but also critical information on changes that affect building and public spaces. For example, entrepreneur A would take advantage of the specialized business forums and knowledge communities where architectural firms would collaborate to deepen their understanding of a certain topic. On an irregular basis, he would also participate in conferences and trade-shows

organised by Bostons' Architectural Center. Entrepreneur A who had graduated from MIT had further managed to maintain significant informative ties to his former educational institution. Through the years, however, he was able to foster ties to other relevant universities in the Boston area, such as Northeastern University, Boston Architectural Center and Wentworth Institute of Technology. The reason behind why the entrepreneurs had chosen to retrieve information from such diverging sources as institutions versus firms was not completely clear to me. Since entrepreneur A had set up his firm more than 10 years earlier than entrepreneur B, the diverging informative sources may simply have been a consequence of fluctuating trends within the architectural milieu. However, it is also plausible that personal preference played a determining role.

Further illustrated by figure fourteen is the fact that interviewees from architectural services only made use of informative contacts from the local and the extended local environment. The total lack of national or transnational connections demonstrates that the architectural interviewees are much more spatially dependant than the previous interviewees in this case study. The importance of local connections have not, however, translated into a concrete architectural agglomeration. In contrast, firms are widely spread in the local environment. The nature of the US architectural industry that forces architectural firms to go through demanding registration procedures in all the states they choose to operate in, is partly responsible for the architectures' spatial limitations.

Interestingly, the ethnic composition of the architectural community was almost identical to the aggregated high-tech milieu. While 94% consisted of white actors, 3% were Asians, 1% African American and 2% Latino<sup>25</sup>. Both of the Indian entrepreneurs in architectural services were striving to become part of the mainstream architectural milieu. While entrepreneur B claimed to have experienced a smooth integration into the local architectural network, entrepreneur A had found the process severely complicated. In entrepreneur A's words:

I am a foreigner, you know. It's difficult to break into the mainstream, but necessary.  
Most business goes by word of mouth.

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<sup>25</sup> [www.architects.org](http://www.architects.org)

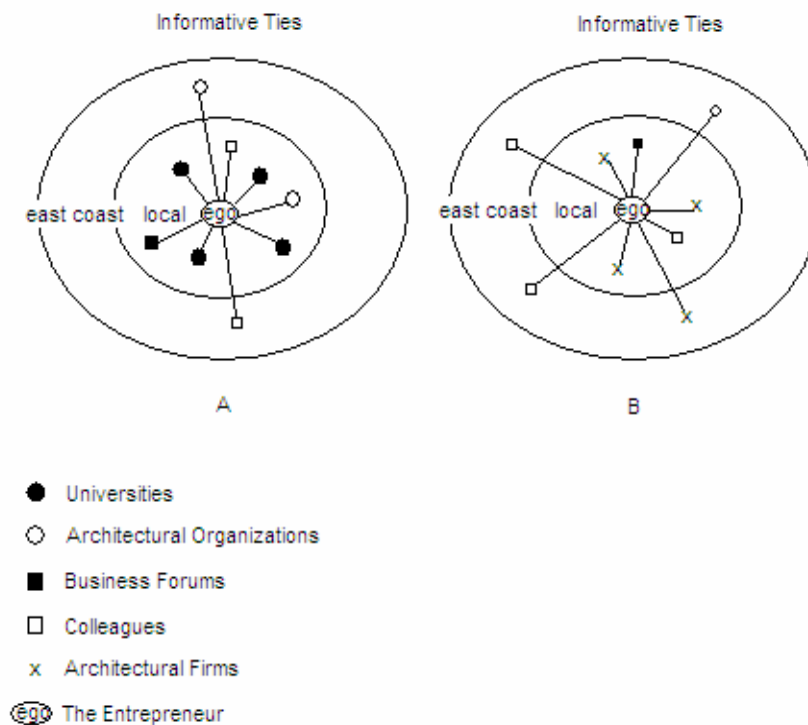


Figure 14. The social tie-model of the two Indian entrepreneurs from architectural services.

In fact, the National organization of Minority Architects (NOMA) has fought against discrimination of minorities within the architectural field since 1971. Nonetheless, the former president of NOMA<sup>26</sup> admits that it may not only be the exclusionary pressure from the majority that prevents minorities from participating in the design profession, but also their preference for similar others:

Architecture and architects are an integral part of the culture of the elite in our society. That elite is overwhelmingly white and male. Those who might consider becoming an architect must invariably come into contact with this cultural phenomenon. Human nature renders us wary of individuals who belong to a group other than our own. A lack of women and ethnic minorities in architecture leads us to a lack of women and ethnic minority architects.

When taking into account entrepreneur A's limited knowledge of the English language, it is uncertain whether entrepreneur A has been subject to exclusionary pressure, or if his

<sup>26</sup> [www.architects.org](http://www.architects.org)

difficulties to "break into the mainstream" is simply a result of his own personal inability to relate to the cultural codes of the mainstream. Nevertheless, and equivalent to the computer entrepreneurs, the Indian entrepreneurs from architectural services regarded the integration into the mainstream as a must for fulfilling their ambitions of growth and profit. In contrast to the interviewees from IT/software technologies the architectural interviewees not only took advantage of white and Indian connections, but they also profited from ties to other Asian minorities. Entrepreneur A had a ratio of 50/30/20 between ties to whites, Indians and other Asian minorities. In contrast, interviewee B claimed to have a role-set consisting of 80% white connections while the remaining 20% were divided between Indian and other Asian. Furthermore, while all the entrepreneurs' contacts, irrespective of ethnicity, were characterized by "trust", only the Indian connections would provide the sort of psychosocial support, common between actors with similar interpersonal identities. Finally, diversity of ties was not a priority between the two entrepreneurs in architectural services.





## Chapter 7

### Concluding Remarks

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#### **Summarizing the Nature and the Type of the Connections at use**

I opened this thesis by stating my intentions to explore the type and the nature of the social ties that Asian Indian entrepreneurs have formed, and are making use of, in the daily operations of their firm. I claimed that the research on Indian entrepreneurs' connections would enable me to fulfill my objective; namely that of determining the social tie-strategies that ethnic entrepreneurs from a knowledge intensive sector pursue. Significantly, it would allow me to ascertain whether the social tie-strategies of the knowledge intensive, ethnic entrepreneurs in this study differ from the social tie-strategies that traditional ethnic entrepreneurs have employed. I constructed four research questions, one main question and three subquestions, that would function as tools for analyzing the social ties of the Indian entrepreneurs. They read as following:

- 1) What kind of ties have Indian entrepreneurs adopted in order to stay competitive in Boston's high-tech sector?
  - a) Have Indian entrepreneurs managed to integrate a) spatially and b) socially into the local, established high-tech network?
  - b) Have Indian entrepreneurs developed complementary transnational ties to actors in India's high-tech regions? If yes, can these transnational ties compensate for anticipated exclusionary pressures in the local, established Boston high-tech network?
  - c) Have Indian entrepreneurs in this case study adapted their set of connections to the type of technology at use in their firm?

I specifically pointed out the importance of taking the particularities of the opportunity structure into consideration when analyzing the social ties that ethnic entrepreneurs utilize in the day-to-day operation of their firms. The opportunity structure was defined as the economic, technological, socio-economic and socio-ethnic structures of a specific context which produces a set of possible courses of action. While chapter three identified

important features of the opportunity structure of Boston's high-tech sector, chapter four provided an in-depth, theoretical discussion on selected underlying processes in the environment. The critical features of the opportunity structure that I discussed were the ethnic composition of the high-tech sector, the domination by the white, male elite plausibly resulting in exclusionary pressures such as the unintended and intended consequences of economic action, the shift to software as a core industry and the network form of organization that makes social ties key for a high-tech entrepreneur aiming to stay at the competitive edge. However, I specified that the context might only influence and not determine the actions of ethnic entrepreneurs. Indian entrepreneurs play an active role in shaping the type of connections at use. When analyzing the field data I combined the insights from inter-organizational and social network theory.

To start with subquestion c, the field data revealed that the functional, socio-cultural and institutional/legal conditions of the different technological systems influenced fundamental aspects of the entrepreneurs' role-sets. In other words, Indian entrepreneurs from architecture and engineering services had adopted drastically different social relations than their counterparts specializing in IT/software. The architecture and engineering entrepreneurs belonged to dissimilar high-tech communities that functioned on a disparate logic than the milieu of the computer-based entrepreneurs. These findings not only undermined parts of the theoretical framework of the thesis but also resulted in the need to analyse the entrepreneurs from contrasting sub technologies separately. Accordingly, the answers to questions 1, a, and b must be threefold. It is important to point out that when I analyzed the impact of technology on the entrepreneurs' role-sets, I recognized that technology is always surrounded by social, economical and cultural circumstances that condition its creation, outcome and use. Accordingly, I distanced myself from theories that adopt a technologically determinist stance.

Continuing with subquestion a, the computer based entrepreneurs viewed their perfect spatial integration into the high-tech agglomerations in Cambridge and along routes 128, 495 and 93 as a practical and symbolical necessity for socially integrating into the high-tech industrial district. The computer entrepreneurs' social integration was influenced by specific features in the context. Moreover, factors that would have restrained the IT/software entrepreneurs natural integration into the local high-tech

network, such as the ethnic composition of the sector and the particular power structure of the high-tech community, had been counterbalanced by circumstances of the context that have worked in favour of the Indian entrepreneurs. The shift to software as a core industry, the transitional status of the sector, the recent downturn and the impact of ethnic business forums had facilitated the computer based entrepreneurs integration. The IT/software entrepreneurs believed that integrating into the local, mainstream network was vital for functioning effectively in a white dominated context and had used their individual experiences to pursue their goal. Nonetheless, the computer based entrepreneurs' integration must be considered partial. The entrepreneur from the energy engineering field, specializing in a very different technology, did not view the local high-tech network as relevant for him. Accordingly, he was not affected by the particularities of the context. With help from his team of key employees, however, he had managed to socially integrate into the international mainstream energy community. The two entrepreneurs from architectural services were confronted by a high-tech community similar in characteristics, but distinct from the computer based entrepreneurs. The lack of an agglomeration of architectural firms made spatial integration irrelevant. However, the social integration into the extended local architectural community was regarded as a must in order to stay at the competitive edge. Despite constraints in the environment, such as exclusionary pressures, both of the entrepreneurs had managed to become part of the local architectural network.

With concern to subquestion b, a majority of the computer based entrepreneurs had developed complementary ties to high-tech actors in India. Connections to high-tech centers in India were most important for the R&D process. Being able to work around the clock and utilize cheap computer scientists made ties to India a financial benefit and a competitive advantage for the Indian entrepreneurs. Yet, two IT/software entrepreneurs had not yet implemented their plans of outsourcing parts of their R&D activities. The relationships to Indian high-tech centers did not seem to be a result of the exclusionary pressures in the Boston high-tech community but rather another attempt to achieve their goals of growth and profit. Due to their technological specialization, the entrepreneurs from engineering and architectural services were not able to benefit from ties to software developers and computer scientists in India. The engineering entrepreneur did have

transnational connections to the Indian government but these ties had a subordinate function in the entrepreneur's role-set.

Although I have already given a few answers to the main question, namely what kind of ties Indian entrepreneurs have adopted to stay competitive, I will here present some additional findings that have not been covered by my subquestions. Again, the answer must be threefold. The computer entrepreneurs mainly made use of firm-to-firm relations in the locality complemented by a few national or global connections to other firms. Socially, spatially and ethnically diverse informative connections were specifically important to grasp new opportunities in the market. Moreover, the attempt to integrate into the mainstream, local network did not mean that they had abandoned their co-ethnic ties. Instead, the computer entrepreneurs supplemented connections to mainstream actors with supportive ties to local, co-ethnic experts who were singled out, among other ways, through ethnic business forums. The interviewee from engineering services profited from the role-sets of a team of international experts within the energy field who also functioned as his source of psychosocial support. In contrast to the computer based entrepreneurs, the engineering entrepreneur did not only take advantage of firm-to-firm relations but also benefited from a diversified group of contacts. The interviewee could not afford to consider the ethnicity of his contacts but searched for ties to talented individuals on a global scale. According to the architects, regional informative connections were the sole prerequisite for staying abreast on a range of issues that fundamentally determined their success in obtaining clients and functioning effectively in the architectural field. Both of the architectural interviewees had diversified their informative sources. However, while institutions dominated one of the entrepreneurs' role-sets, firm-to-firm relations were more important for the second entrepreneur. The architectural entrepreneurs further managed to skillfully balance white, Indian and Asian contacts but solely gained support from their co-ethnic ties.

Despite the fact that the nine entrepreneurs specialized in three different sets of technologies the field data revealed that one tie-attribute was universal. All the interviewees benefited from a stable set of *strong connections*, only supplemented by weaker ties that were used on a more irregular basis. Due to the comparable knowledge intensity of the IT/software, architecture and engineering industries, strength was the

governing mechanism of the entrepreneurs' connections enabling the transfer of complex and fine-grained information. However, it is important to point out that the strength of the relations must be viewed in the light of the industrial district framework.

What is specifically interesting about these nine ethnic entrepreneurs from knowledge intensive industries is the fact that all of them were operating smaller companies. Notwithstanding that the entrepreneurs drastically diverged on the type and the characteristics of the social ties they had adopted, they shared a strong awareness of the importance of connections for staying competitive. The interviewees also demonstrated a goal-oriented and rational approach when fostering relationships. Because of the adaption of the network form of organization the entrepreneurs were managing to function effectively in a globalized, regionalized and flexible economy. This is evidence that small firms can be strong and dynamic entities, capable of adapting to market conditions. It further demonstrates that ethnic entrepreneurs have commenced the process of breaking out from spatially and sectorally marginalized arenas and some of them, like my interviewees, are now successfully competing with the mainstream in the most sophisticated sectors of the economy.

### **A Return to the Objective of the Thesis**

Having summarized the type and the characteristics of the connections that nine Indian entrepreneurs in the Boston high-tech sector make use of, I am now in a position to determine the social tie-strategies ethnic entrepreneurs in a knowledge intensive sector may adopt to stay competitive. As I have thoroughly illustrated, there is no uniform answer to the type of connections the Indian entrepreneurs in this case study employ. On the one hand, the entrepreneurs' individual experiences engendered a slightly nuanced representation of the connections at use within comparable sub industries. On the other hand, entrepreneurs had adapted their role-sets to the technological specialization of their firm. As a result, interviewees from computer industries, engineering and architectural services diverged on the very detailed attributes of their ties, as well as on the spatial and ethnic features of their entire role-sets. Accordingly, the conclusion regarding the *pattern* describing how the entrepreneurs position themselves to others in order to accomplish their goals must be divided. The following social-tie strategies have become apparent.

First, while traditional ethnic entrepreneurs' connections tend to be homogenous, the nine Indian entrepreneurs adopted the *strategy of forming connections to a diversified set of actors*. The strategy was particularly evident in the informative ties of the IT/software entrepreneurs. The interviewees maintained relations to socially, ethnically and spatially diverse actors in order to secure a consistent flow of information on new opportunities in the market. The engineering and architectural entrepreneurs had diversified their sources of contacts in a slightly different manner. They benefited from ties to a range of actors such as firms, universities, former colleagues, labs, foreign governments, donor agencies and architectural organizations.

Second, interviewees from all technological specializations employed the *tie-strategy of breaking into the networks of the mainstream*. In contrast to ethnic entrepreneurs in low-skilled sectors, the nine Indian entrepreneurs have moved away from an over reliance on ethnic communal resources towards increasing use of mainstream actors, institutions and markets. However, I observed differences in regards to how, and to what degree, Indian entrepreneurs had integrated into their respective mainstream networks. I was further able to detect variations in the openness of the various high-tech communities. The effort of the computer based entrepreneurs to break into the network of the mainstream was less strenuous than the attempt of one of the architectural entrepreneurs, due to significant changes in the structure of the IT/software community. In other words, the opportunity structure had recently advanced decisively in favour of the computer entrepreneurs, facilitating their integration.

Third, while the traditional image of ethnic entrepreneurs is the ethnic enclave with limited ties to the outside economy, the Indian engineering and computer entrepreneurs had adopted an *external social tie-strategy*. The interviewees took advantage of numerous connections on a national or global scale. Indian entrepreneurs from the IT and software industries were specifically reaping the benefits from transnational ties to skilled computer scientists in India. The nature of the architectural industry, on the other hand, restricted the two architectural entrepreneurs to the local extended environment.

Fourth, the Indian architecture and computer entrepreneurs adhered to the traditional approach among ethnic entrepreneurs, and supplemented the diversifying,

integrational and external tie-strategies with *ethnic strategies*. In contrast to their counterparts in low skilled sectors, they managed to skillfully balance the co-ethnic connections with integration into the mainstream. As a result, they had not been subject to the insularity and segregation that many traditional ethnic entrepreneurs have experienced. Due to the greater comfort they felt in being with other Indians, they benefited from psychosocial support from their local ethnic community. Despite the under representation of Indian entrepreneurs in IT and software, the interviewees specializing in these technologies were able to seek out local co-ethnic experts through ethnic business forums.

Hence, the nine Indian entrepreneurs from knowledge intensive industries within the Boston high-tech sector are gradually moving away from the distinctiveness that traditionally characterized ethnic entrepreneurship. What specifically distinguished these Indian entrepreneurs from traditional ethnic entrepreneurs is the diversification of their social tie-strategies, their extroverted behavior and their advancement towards integration into the networks of the mainstream. The traditional ethnic entrepreneur has been perceived as having little interest in mainstream social life, consumerism and self-expression. The ethnic entrepreneur has further been depicted as being content with tolerable survival. However, the nine Indian entrepreneurs from the Boston high-tech sector are driven by goals such as growth and profit. In fact, the entrepreneurs in this study included some of the regions most successful and fast-growing companies. Not only was the launching process and the day-to-day operation characterized by innovative activity, but every aspect of the Indian entrepreneurs' courses of action reflects a remarkable level of inventiveness and ingeniousness.

By exploring the connections of Indian entrepreneurs who have escaped spatially and marginalized arenas, I have expanded our understanding of the tie-strategies ethnic entrepreneurs may pursue. More importantly, by highlighting the specific tie-strategies of nine ethnic entrepreneurs from a *knowledge intensive sector* I have taken one step towards a less biased ethnic entrepreneur theory. The qualitative nature of this study, however, makes generalizations to whole populations of minorities unthinkable. Moreover, since strategies emerge from the interaction of opportunity structures and the purposeful action of actors, studies on the social-tie strategies of ethnic entrepreneurs



must be considered place-specific. Accordingly, there are still many issues deserving greater attention. I propose that the following steps be prioritized. First, more rigorous, quantitative, comparative data that takes the particularities of the opportunity context into consideration would enable scholars to determine whether there is a systematic difference in tie-strategies between ethnic entrepreneurs from knowledge intensive sectors and their counterparts from low-skilled arenas. For example, is integration into the networks of the mainstream a strategy specifically characterizing ethnic entrepreneurs in knowledge intensive sectors? Secondly, almost no studies have examined the relationship between social tie-strategies and the performance of the entrepreneur's firm. Thus, we have no understanding of how the choice of strategies influences entrepreneurial success. Finally, since much of the research carried out on ethnic entrepreneurs is static, scholars know little about if, and how, ethnic entrepreneurs' tie-strategies alter from the early stages of growth to the more mature phases of their firm. Therefore, I recommend more longitudinal and dynamic research designs in order to create a more comprehensive and complete body of ethnic entrepreneur theory.

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Greater Boston Chamber of Commerce 2001.

Massachusetts Software and Internet Industry Council 2001.

Massachusetts Software and Internet Industry Analysis 2002.

## Appendix 1

### Personal

Please answer the following questions describing yourself. Your responses to these questions will NOT be released to anyone on any individual basis.

1) Are you male or female? male / female

2) Did you immigrate to the United States? Yes / No

2a) If YES, how many years ago? \_\_\_\_\_

2b) What is your current immigration status (i.e. citizen, green-cardholder, noncitizen)? \_\_\_\_\_

3) What is your highest level of formal education? \_\_\_\_\_

4) Please, name the institution/s and place/s where you got your post high-school education

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5) How long have you been living in the Boston region? \_\_\_\_\_

6) Did you have a regular job in a high-technology sector, before launching your own firm? Yes / No

6a) Did you have a regular job in the Boston high-technology sector? Yes / No

### Your Firm

7) What year did you launch your firm? \_\_\_\_\_

8) What was the most important factor when deciding where to locate your firm (referring to the current location of your firm)? \_\_\_\_\_

\_\_\_\_\_

9) How many employees do you have today? \_\_\_\_\_

10) Which of the following activities (if any) have occurred within your firm? (Check all that apply)

- \_\_\_\_ Technological alterations of a product
- \_\_\_\_ Technological alterations in any process
- \_\_\_\_ The development of a new product
- \_\_\_\_ The development of a new service
- \_\_\_\_ Radical innovation (meaning a radical change that transforms the current supply and demand pattern)

11) Which of the following activities (if any) continuously occur in your firm? (Check all that apply)

- \_\_\_\_ Technological alterations of a product
- \_\_\_\_ Technological alterations in any process
- \_\_\_\_ The development of a new product
- \_\_\_\_ The development of a new service
- \_\_\_\_ Radical innovation (meaning a radical change that transforms the current supply and demand pattern)

12) Please rate the level of sophistication of the technology at use in your firm, on a daily basis. Circle one of the numbers below where one equals 'simple' and six equals 'exceptionally advanced'.

1            2            3            4            5            6

### Contacts

All entrepreneurs make use of some kind of contacts (i.e. suppliers, other firms, institutions, trade organisations, or individuals like friends, family and previous colleagues) when running their firm. When answering the following questions, think about the relations that are important for the daily operations of your firm, or the contacts that have been crucial in a specific situation/ phase of your firm. You should include your **regional** and **national** ties as well as your **global** (if any) connections. If your contact is a representative of an organization, institution or firm, please list both the **initials** of the person and his/her **affiliation**.

13) First we will focus on the contacts that you retrieve **information** from (i.e. information on prospective employees, new clients, new technology, new products, new markets etc). Please list 5 of your regional, national or global contacts that are/have been most important to your firm. If there are less than 5, answer for as many as appropriate. Use initials of the person and (if applicable) the name of the organization.

A) \_\_\_\_\_

B) \_\_\_\_\_

C) \_\_\_\_\_

D) \_\_\_\_\_

E) \_\_\_\_\_

14) I could mention more than 5 information contacts (Circle one):            Yes            No

Now, keep this list in mind as you answer questions no 15-19.

15) Please circle the race/ethnicity that best describes each person on your list. Circle one for each person, and specify if you choose the category "other"

A) Asian Indian	Other Asian	White	Other _____
B) Asian Indian	Other Asian	White	Other _____
C) Asian Indian	Other Asian	White	Other _____
D) Asian Indian	Other Asian	White	Other _____
E) Asian Indian	Other Asian	White	Other _____

16) What was your initial relationship to the contacts on your list? (i.e. a relative, friend, university mate, colleague, business contact etc)

A) \_\_\_\_\_

B) \_\_\_\_\_

C) \_\_\_\_\_

D) \_\_\_\_\_

E) \_\_\_\_\_

## Appendix 1

17) Please state whether the people/organizations on your list are regional, national or global contacts. If national, please specify the **state** where your contact resides. If global, please specify the **country**.

	Regional	National: State	Global: Country
A)	_____	_____	_____
B)	_____	_____	_____
C)	_____	_____	_____
D)	_____	_____	_____
E)	_____	_____	_____

18) How often do you interact with the persons on your list. Circle the best answer for each.

A) weekly	monthly	once every 6 months	once a year
B) weekly	monthly	once every 6 months	once a year
C) weekly	monthly	once every 6 months	once a year
D) weekly	monthly	once every 6 months	once a year
E) weekly	monthly	once every 6 months	once a year

19) Please state how long you have known or been connected to the persons/ organizations on your list.

A) \_\_\_\_\_  
 B) \_\_\_\_\_  
 C) \_\_\_\_\_  
 D) \_\_\_\_\_  
 E) \_\_\_\_\_

20) The following questions ask how well each pair of people on your list know each other, to the best of your knowledge. Check one answer for each

	not at all	some	very well
Person A and B know each other:	_____	_____	_____
Person A and C know each other:	_____	_____	_____
Person A and D know each other:	_____	_____	_____
Person A and E know each other:	_____	_____	_____
Person B and C know each other:	_____	_____	_____
Person B and D know each other:	_____	_____	_____
Person B and E know each other:	_____	_____	_____
Person C and D know each other:	_____	_____	_____
Person C and E know each other:	_____	_____	_____
Person D and E know each other:	_____	_____	_____

21) Following a similar pattern of questions as above, we will now focus on your contacts that equip you and your firm with **physical resources** (i.e. suppliers, financial capital etc.). Please list 3 contacts that in some way supply you with physical resources. If there are less than 3, answer for as many as appropriate. If applicable, you may also list a contact that you have already mentioned under information contacts. Again, use the initials of the person and (if applicable) his/her affiliation .

F) \_\_\_\_\_  
 G) \_\_\_\_\_  
 H) \_\_\_\_\_

Now, keep this list in mind as you answer questions no 22-26.

22) Please circle the race/ethnicity that best describes each person on your list. Circle one for each person, and specify if you choose the category "other"

F) Asian Indian	Other Asian	White	Other _____
G) Asian Indian	Other Asian	White	Other _____
H) Asian Indian	Other Asian	White	Other _____

23) What was your initial relationship to the contacts on your list? (i.e. a relative, friend, university mate, colleague, business contact etc.)

F) \_\_\_\_\_  
 G) \_\_\_\_\_  
 H) \_\_\_\_\_

24) Please state whether the people/organizations on your list are regional, national or global contacts. If national, please specify the **state** where your contact resides. If global, please specify the **country**.

	Regional	National: State	Global: Country
F)	_____	_____	_____
G)	_____	_____	_____
H)	_____	_____	_____

25) How often do you interact with the persons on your list. Circle the best answer for each.

F) weekly	monthly	once every 6 months	once a year
G) weekly	monthly	once every 6 months	once a year
H) weekly	monthly	once every 6 months	once a year

26) Please state how long you have known or been connected to the persons/organizations on your list

F) \_\_\_\_\_  
 G) \_\_\_\_\_  
 H) \_\_\_\_\_

Repeating the pattern of questions again, I will now ask you about your contacts relating to **innovative activity**. Innovative activity refers to alterations in products or processes, the development of a new product or service, or radical change that transforms the current supply and demand pattern. As before, you may list a contact that you have already mentioned. Please use the initials of the person and (if applicable) his/her affiliation. If there are less than 3, answer for as many as appropriate. If non of these activities occur in your firm, you can proceed to question number 33.

27) Please list 3 contacts that you collaborate with, or have cooperated with, regarding innovative activity.

I) \_\_\_\_\_  
 J) \_\_\_\_\_  
 K) \_\_\_\_\_

Now, keep this list in mind as you answer question no 28-32.

28) Please circle the race/ethnicity that best describes each person on your list. Circle one for each person, and specify if you choose the category "other"

## Appendix 1

I) Asian Indian      Other Asian      White      Other \_\_\_\_\_  
 J) Asian Indian      Other Asian      White      Other \_\_\_\_\_  
 K) Asian Indian      Other Asian      White      Other \_\_\_\_\_

29) What was your initial relationship to the contacts on your list? (i.e. a relative, friend, university mate, colleague, business contact etc)

I) \_\_\_\_\_

J) \_\_\_\_\_

K) \_\_\_\_\_

30) Please state whether the people/organizations on your list are regional, national or global contacts. If national, please specify the **state** where your contact resides. If global, please specify the **country**.

Regional      National: State      Global: Country  
 I) \_\_\_\_\_

J) \_\_\_\_\_

K) \_\_\_\_\_

31) How often do you interact with the persons on your list. Circle the best answer for each.

I) weekly      monthly      once every 6 months      once a year  
 J) weekly      monthly      once every 6 months      once a year  
 K) weekly      monthly      once every 6 months      once a year

32) Please state how long you have known or been connected to the persons/organizations on your list

I) \_\_\_\_\_

J) \_\_\_\_\_

K) \_\_\_\_\_

Finally, I will ask you about your **supportive** contacts (i.e. individuals or organizations that offer advice, guidance, encouragement etc.). You may again, list a contact that you have already mentioned. Please use the initials of the person and (if applicable) his/her affiliation. If there are less than 2, answer for as many as appropriate.

33) Please list 2 contacts that you gain support from

L) \_\_\_\_\_

M) \_\_\_\_\_

Now, keep this list in mind as you answer question no 35-39

34) Please circle the race/ethnicity that best describes each person on your list. Circle one for each person, and specify if you choose the category "other"

L) Asian Indian      Other Asian      White      Other \_\_\_\_\_  
 M) Asian Indian      Other Asian      White      Other \_\_\_\_\_

35) What was your initial relationship to the contacts on your list? (i.e. a relative, friend, university mate, colleague, business contact etc)

L) \_\_\_\_\_

M) \_\_\_\_\_

36) Please state whether the people/organizations on your list are regional, national or global contacts. If national, please specify the **state** where your contact resides. If global, please specify the **country**.

Regional      National: State      Global: Country  
 L) \_\_\_\_\_

M) \_\_\_\_\_

37) How often do you interact with the persons on your list. Circle the best answer for each.

L) weekly      monthly      once every 6 months      once a year  
 M) weekly      monthly      once every 6 months      once a year

38) Please state how long you have known or been connected to the persons/organizations on your list.

L) \_\_\_\_\_

M) \_\_\_\_\_

END OF QUESTIONNAIRE – Thank you for your time and cooperation!

## **Interview Protocol**

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### **Explorative Topics that Followed up on the Entrepreneurs' Responses to the Questionnaire**

- 1) The background of the entrepreneur
- 2) The reasons behind starting a firm, in this specific technology, in this specific place.
- 3) The specific characteristics of selected connections and the ethnicity of the ties
- 4) The ties to other high-tech areas in the US
- 5) The ties to India. The reason behind developing ties to India
- 6) The relation between local and national/global ties
- 7) The relation between white and co-ethnic/multiethnic ties

### **Specific Questions**

- 1) I want you to think back to the early growth period of your firm (the first two years), can you explain how you developed some connections for your firm? (For example to suppliers, clients, recruitment channels, trade organizations, information etc.)
- 2) If you think back to the early growth period of your firm, how did you experience the development of connections? Why do you think you experienced it that way?
- 3) If you, again, think back to the early growth period of your firm, what kinds of skills, background or experience were particularly important when developing some first connections for your firm?
- 4) You launched your firm in 19... . What was the attitude towards minority business in Boston at that point?
- 5) Would you describe Boston's contemporary high-tech environment as receptive to minority business?
- 6) If you had to mention the most severe impediments/hindrances that you faced when developing your connections, what would they be?
- 7) Do you think that you have been confronted with skepticism due to your minority status? If yes, please give an example.
- 8) If NO, Why do you think that you have never experienced any discrimination?

## Appendix 2

- 9) Do you think that other minority entrepreneurs in the high-tech sector have experienced any discrimination?
- 10) What kind of skill, background, experience was most important for you when developing ties to individuals in the Boston high-tech milieu?
- 11) What kind of advice would you give an Indian entrepreneur setting up a firm in the area and who is in the process of developing a network for his firm?
- 12) If you had to mention the three most important prerequisites for starting a high-tech firm, what would they be?

### Appendix 3

Industry	White	Asians	Black-Am.	Pacific Isl.	Native Am.	Other Race	Total
Computers/Hardware	85						85
Electrical Equipment	706	34	35			17	792
Transportation	140						140
Instruments	601						601
Tele-communications							0
Engineering services	15559	612	272	21	78	43	16585
Software	5206	168	208		10	88	5680
Total	22297	814	515	21	88	148	23883
Standard error	842	161	127	*	53	69	

\*According to the US  
Census, numbers under 50  
are too small to be reliable

	Indian	Chinese	Japanese	Korean	Asian Other	Total
Industry						
Computers/Hardware						0
Electrical Equipment	24	10				34
Transportation						0
Instruments						0
Tele-communications						0
Engineering services	107	271	133	37	64	612
Software	50	84			34	168
Total	181	365	133	37	98	814
Standard Error	75	108	65	*	56	

\*According to the US  
Census, numbers under 50  
are too small to be reliable

## Tabulations of the US Census 2000 datafiles

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### Errors in Data

Statistics in the US census 2000 datafiles are based on a sample. Therefore, they may differ somewhat from the 100% figures that would have been obtained if all housing units, people within those housing units, and people living within group quarters had been enumerated using the same questionnaires, instructions, enumerators, and so forth. The sample estimate also would differ from other samples of housing units, people within those housing units, and people living in quarters. The deviation of a sample estimate from the average of all possible samples is called the sampling error. The standard error of a sample estimate is a measure of the variation among the estimates from all possible samples. Thus, it measures the precision with which an estimate from a particular sample approximates the average result of all possible samples. The sample estimate and its estimated standard error permit the construction of interval estimates with prescribed confidence that the interval includes the average result of all possible samples.

In addition to the variability that arises from the sampling procedures, sample data is subject to non-sampling error. This includes errors such as nonresponse errors, respondent and enumerator errors and processing errors. Non-sampling error may affect the data in two ways: errors that are introduced randomly will increase the variability of the data and, therefore, should be reflected in the standard error; errors that tend to be consistent in one direction will make sample data biased in that direction. For example, if respondents consistently tend to underreport their incomes, then the resulting counts of households or families by income category will tend to be understated for the higher income categories and overstated for the lower income categories. Such systematic biases are not reflected in the standard error. However, a number of techniques were implemented during the census planning and development stages to reduce various types of non-sampling errors. Quality assurance methods were used throughout the data collection and processing phases of the census to improve the quality of the data. In addition, the census bureau implemented a reinterview program to minimize errors in the datacollection phase for enumerator-filled questionnaires (US Census bureau's technical documentation 2000).

### Producing Tabulations

In order to produce estimates of the ethnic composition of high-tech entrepreneurs in the Boston Metropolitan, I simply made cross-tabulations of the appropriate variables and added the weights of all persons that possessed the characteristic of interest. To create person estimates, I used the 'person weight'. The following variables were recoded and employed in the cross-tabulations:

Race2<sup>1</sup> was recoded into: White<sup>2</sup> (1), Chinese (40), Asian Indian (37), Japanese (45), Korean (46) and Other Asian (38, 39, 41-44, 47-54). The other races were classified as 'not in universe'.

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<sup>1</sup> Hispanics are not included in the US Census variable Race2. However, since Hispanics have little to no impact in the high-tech industries, it does not significantly alter the total number of high-tech entrepreneurs.

<sup>2</sup> The numbers correspond to labels used in the variables in the US Census data file 2000.



## Appendix 4

Race2 was recoded into: Asian (37-55), Black American (2), Native American (3-18, 21-36), Pacific Islander (56-63) and White (1). The other ethnicities were classified as 'not in universe'.

IndNAICS (Industry codes) was recoded into: Computers (3341), Electrical equipment (333M, 334M1, 334M2, 3352, 335M), Engineering Services (5413, 5416, 5417, 5419Z), Instruments (325M, 3345, 3391), Software (5112, 5141Z, 5142, 5415, 8112), Telecommunications (51331, 5133Z), and Transportation (336M, 33641M1, 33641M2, 3365, 3366, 3369). The other NAICS industry codes were classified as 'not in universe'.

Clwkr (class of worker) was recoded into self-employed (6,7). The other classes of workers were classified as 'not in universe'.

PUMA5 (Public Use Microdata Area) Designates area of 100 000 or more population. Following the US census definition for the Boston Metropolitan Area I recoded the appropriate areas into the variable 'Boston Metropolitan Area'. The following area codes were included: 400, 900, 1000, 1100, 1200, 1300, 1400, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3301, 3302, 3303, 3304, 3305, 3400, 3500, 3600, 3700, 3800, 3900, 4200, 4300, 4600.

The NAICS codes were singled out based on DeVol's (1999) definition of high-technology industries. However, I had to recode DeVol's older SIC codes into the new classification system of NAICS codes. For this purpose, I used the US Census Bureau's conversion tables which may be found on [www.census.gov](http://www.census.gov). Since the US Census data file do not operate with the full list of NAICS codes, I in some instances had to choose the best fitting code and in other situations exclude an appropriate code. However, at an aggregate level, my selection of NAICS codes do represent industries that are characterized by a high degree of technological sophistication, large R&D expenditures and capacities, a high patent and innovation intensity and industries that have a substantial technological impact on other economic sectors, recommended by DeVol (1999).

### Calculating Standard Errors

In order to calculate standard errors for the estimates I used the following formula:

$$SE(\hat{Y}) = \sqrt{19 (\hat{Y}) (1 - \hat{Y}/N)}$$

$\hat{Y}$  = the weighted estimate

N = the sum of the PUMS weights for all people in the geographic area

The basic standard error was then multiplied by the design factor of the appropriate variable, derived from US Census bureau's technical documentation file. If many variables were used in the tabulations, the US Census bureau recommends to use the highest design factor. Accordingly, I used the design factor 1.3 for the variable 'Class of Worker'.